Chemical Wa

September 15, 1956
IN TWO PARTS • PART ONE

-Week-

Price 35 cents



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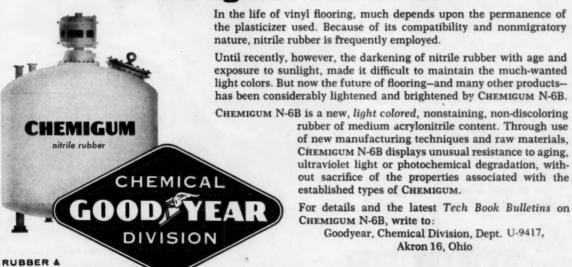
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DEPARTMENT

Girdler building \$5,000,000 addition for **B. F. Goodrich Chemical Company**



GREATLY INCREASED flow of Geon A polyvinyl chloride resins and other plastic compounds will soon be coming from B. F. Goodrich Chemical Company's plant at Avon Lake, Ohio. Girdler-who engineered and constructed existing facilitieswill act as general contractor for the expanded processing plant.

The plastic resins which are produced here are the raw materials for an ever-increasing number of products ranging from plastic pipe to Army ponchos, from truck tarpaulins to circus tents.

Naturally, Girdler feels proud of being entrusted with responsibility for this expansion project. It's a good indication that our experience and ability pay off in performance. Keep this in mind when you plan process plant expansion or modernization and take advantage of our complete service and vast experience, too. Call or write for complete information.



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Chemical Week

TOP OF THE WEEK

September 15, 1956

- Chemicals have vaulted into third place among U.S. industry's foreign investments, are now outpaced only by motor vehicles and equipmentp. 30
- The Reichhold-Catalin merger is off again. Reichhold made the move, says proposed financing is neither sound nor adequatep. 31
- It's no fish story-23 million anglers represent a big potential market for such specialties as fish attractants, bait enhancers
- National Petro-Chemicals solves water supply problem by boosting river flow during dry seasonp. 66

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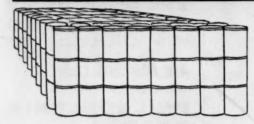
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By: A. W. Moenkhaus
Sales Manager, Bag Division
Fulton Bag & Cotton Mills
St. Louis, Mo.



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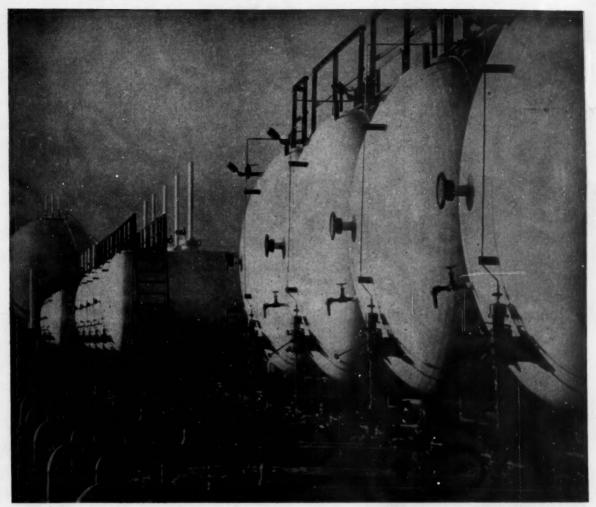
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A small part of the huge hydrocarbon storage tank farm above and below ground at Petro. Propane is stored in the cylindrical tanks,

butane and natural gasoline in the bubble-shaped Hortonspheres. Additional propane is stored in man-made caverns 330 feet down.

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products you need

The ethane is converted into ethylene, which is in turn converted to ethyl chloride, ethyl alcohol, ether and polyethylene. U.S.I. ammonia and sulfuric acid plants next door supply and receive raw materials.

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Petro can manufacture products other than these if the demand arises—products that can be made from the many raw materials available at the plant site.

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USE AN

IGEPAL CO

IN YOUR PROCESS OR PRODUCT

The 8 products that comprise the Igepal CO series of non-ionic surfactants, while chemically alike, are different in ethylene oxide content, solubility and performance characteristics. They are specifically designed and performance tested for use in technical processes and consumer products requiring a stable non-ionic surfactant.

The correct hydrophobic-hydrophyllic balance of any surfactant system is essential to optimum performance. The eight products in the Igepal CO series cover the practical range of hydrophobic-hydrophyllic ratios for nonylphenol to ethylene oxide.

Furthermore, being non-ionic, the Igepals are not limited in their use because of undesired reactions with electrolytes and are stable to hydrolysis by acids and alkalis even at elevated temperatures.

To assist you in planning significant experiments in your product or process, the exact composition of the Igepal CO products are described below. Matched sets of samples are available upon request.

CoH₁₀ (OCH₂CH₂InOH HYDROPHOBIC HYDROPHYLLIC

PRODUCT
Igepal CO-210
Igepal CO-430
Igepal CO-530
Igepal CO-630
Igepal CO-710
Igepal CO-730
Igepal CO-850
Igepal CO-880

n'		0	ETHYLENE OXIDE
13.2			23
4			44
6			54
9-10			65
10-11			68
15			75
20			08
30			86

CLOUD POINT, 1% SOLUTION
Insoluble in water
Insoluble in water
Cloudy at 32 F.
126-133 F.
158-165 F.
203-212 F.
Clear at 212 F.

Clear at 212 F.

*Moles of ethylene oxide per mole of nanylphenal

IGEPAL CO

SURFACTANTS ARE USED IN PRODUCTS OR PROCESSES FOR:

To indicate the wide range of performance characteristics available with Igepal CO surfactants, some typical uses are shown for each product:

IGEPAL CO-210

In high concentrations, serves as de-foaming agent in low foaming deter-

gents.
In low concentrations, acts as foam stabilizer for high foaming detergents. Co-emulsifier in non-ionic surfactant blends.

Defoaming agent in cold water cleaners. Oil soluble detergent and dispersing agent for use in petroleum oils.

IGEPAL CO-430

Oil soluble emulsifying agent.

Intermediate in the synthesis of high foaming, water soluble sulfate esters. Oil soluble detergent and dispersing agent for use in petroleum oils.

IGEPAL CO-530

De-inking of paper.

Emulsifier for silicones and agricul-tural chemicals.

Oil soluble surfactant and emulsifying

Detergent and dispersing agent for use in petroleum oils.

Surfactant for use in all phases of textile processing.

Fast rinsing surfactant for cleaning paper machine felts.

Rewetting agent for paper towels and tissues.

Wetting agent in hide soaking and penetrant in fat liquors.

Surfactant for household and industrial cleaning formulations.

Wetting agent for use with mineral acids and corrosion inhibitors.

IGEPAL CO-710

Can be used interchangeably with Igepal CO-630 in most applications, and is particularly effective when higher temperatures are employed.

Highly efficient textile detergent in neutral, acid and alkaline media. Surfactant in heavy duty liquid detergent formulations and in controlled suds laundry and household formula-

IGEPAL CO-730

Surfactant for high temperature general detergency, and dispersing.

Emulsifying agent for fats, oils and waxes.

Penetrating and wetting agent in caustic solutions.

Surfactant for use with high concentrations of electrolytes.

Wetting agent for use with mineral acids and corrosion inhibitors.

IGEPAL CO-850

Surfactant for high temperature gen-oral detergency and dispersing. Wetting agent in high concentrations

of electrolytes. Emulsifying agent for fats, oils and

Stabilizer for synthetic latices.

Detergent for high temperature scouring of textiles in pressure equipment.

Stabilizer for synthetic latices.

Surfactant for high temperature general detergency and dispersing. Emulsifying agent for fats, oils and

Wetting agent in high concentrations of electrolytes.

MANY APPLICATIONS REQUIRE A MIXTURE OF BOTH AN OIL-SOLUBLE AND WATER-SOLUBLE NON-IONIC SURFACTANT. IN SUCH CASES WE SUGCEST THE USE OF AN IGEPAL HAVING A LOW ETHYLENE OXIDE CONTENT IN COMBINATION WITH ONE HAVING A HIGH ETHYLENE OXIDE CONTENT. THIS WILL GIVE IMPROVED EMULSION STABILITY OVER A WIDER TEMPERATURE RANGE.

For assistance on complex surfactant problems, our technical staff is always available for consultation. Technical literature on the Igepal CO surfactants will be supplied upon request. Prompt shipments can be made from warehouse stocks maintained at

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September 15, 1956 • Chemical Week

AGRICULTURE CHEMICAL MANUFACTURING COSMETICS LEATHER PAPER **PETROLEUM** RUBBER

Landmarks

Periodic progress reports of interest and value to the chemical field

New fluid flow cans with polyethylene nozzle assure even pouring and exact, dripless cut-off

Tailor-made for liquid detergents and other corrosive products, Continental's recently-announced fluid flow cans incorporate a threaded, dripless polyethylene nozzle which is an innovation in the general line packaging field. Attached by a special Continental-engineered method, the tall nozzle permits an even pouring flow and provides an abrupt, exacting cut-off when pour is completed.

New enamel linings perfected by Continental's Research and Development department make these cans ideal for many products which could not be previously packaged in metal. In addition, a resistant varnish is available to prevent any marring of the lithographed surface through spillage in filling or use.

No solder is used anywhere in the construction. The side seam is cemented with thermo-plastic cement which permits complete wrap-around lithography. Can domes or tops can be supplied plain, coated, or lithographed in colors. Nozzles come in colors to closely match decorative designs. Manufactured in 12-, 16-, 22-, 32-oz. and half-gallon sizes.



Threaded polyethylene nozzle is dripless. Attached by solderless method — no solder margin to steal from lithographed area.



BACK VIEW

Side seam is securely cemented, permitting complete wrap-around decoration. No wide soldered seam to interrupt your selling message.

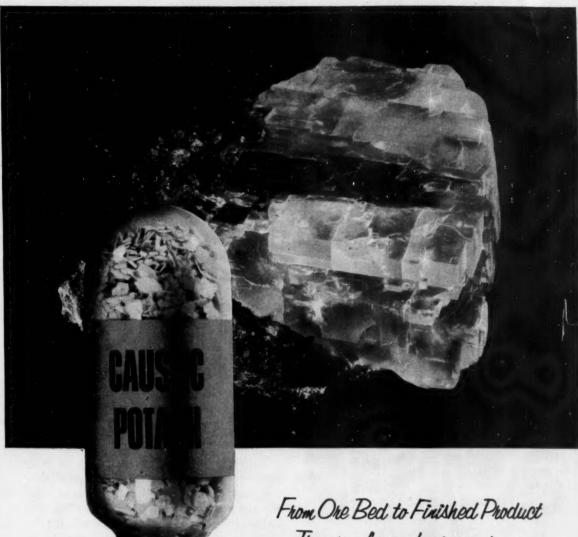


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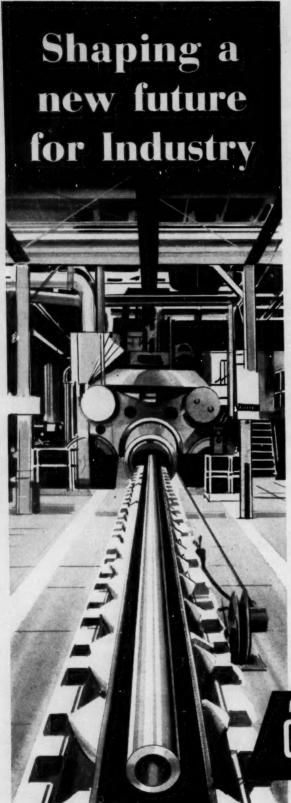
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You get important "extras" from International, the one basic producer of Caustic Potash. Unquestioned security of supply. Uniform quality. High purities. All standard grades. Prompt shipments.

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Remarkable PLASTISOL ...improves so many products it's an industry itself!

So versatile is plastisol (Exon 654 in the Firestone line of vinyl resins) that its uses are spreading rapidly throughout industry.

All kinds of products are being made better to sell better, with the benefits of plastisol compounds made with Exon 654.

Look at the picture above—plastisol at work! Slush molded of Exon 654, the doll acquires a natural look and feel, a washable skin. The supermarket wagon is dipcoated with Exon 654 so moisture can't rust it. Exon 654 plastisol coating makes the handbag fabric more durable, colorful, fashionable. Greases can't affect the Exon 654-coated dish drainer.

Even the car itself! It can actually cost less because plastisol reduced production costs! Assembly lines now use grappling hooks to lift the chassis because abrasion-proof plastisol coatings on the hooks prevent marring or scratching the car surface. And the car's battery and other parts were made in a plant that coated its tanks with Exon 654 so that acids wouldn't corrode them.

This remarkable plastisol, Exon 654, is just one of the many resins in industry's most complete line of versatile vinyls. It is another reason why industry looks to Firestone Exon for engineered answers to its needs.

it's made of

because.





VERSATILE VINYL RESINS

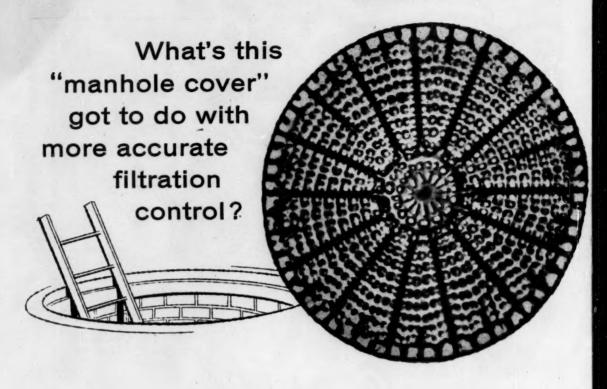
engineered answers to industry's needs

For complete information or technical service on the entire line of Exon resins, call or write today: CHEMICAL SALES DIVISION

Firestone Plastics Company supplies the plastisol resin only...does not make compounds or finished products.

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THIS "MANHOLE COVER" is really a magnification of Arachnoidiscus ornatus, one of the hundreds of different intricate particles that make Celite such an effective filter aid.



It's a particle of CELITE with the



The photomicrograph at left shows the wide variety of particle shapes and sizes in a typical Celite sample. By carefully controlling the proportions of particle sizes, the most complete range of grades is obtained.

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Johns-Manville CELITE



elite's wide range of grades permits precise control of several fferent filtration operations in the brewing of beer and ale, These clude various ruh beer filtrations, wort filtration, final beer plishing and purification of brewing and bottle wash waters.



In Industry's modern research laboratories, Celite filtration has proved itself an indispensable tool. Special grades of Celite have been developed that are particularly effective in analytical methods requiring filtration or chromotographic study.



In the manufacture of lubricating oils, Celite filter aids completely remove bleaching clay from the oil itself and also clarify the many additives used by the industry.

the diatomite filter aid widest range of grades

feed maximum clarification? Use lelite* Filter-Cel. Or does your filtation require the fastest flow rates? hen use Celite 545. In addition, nere are 7 more intermediate grades lus many special grades produced or specific applications. Thus, with lelite, you can establish the exact alance of clarity and flow rate that our process requires. No other diatmite gives you such a wide choice forades.

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And Celite is uniform. Every pound of Celite comes from the world's largest and purest commercially available diatomite deposit. Every pound is processed and graded at the same plant under the same conditions. Yet, with the large inventory maintained at the plant and Johns-Manville's

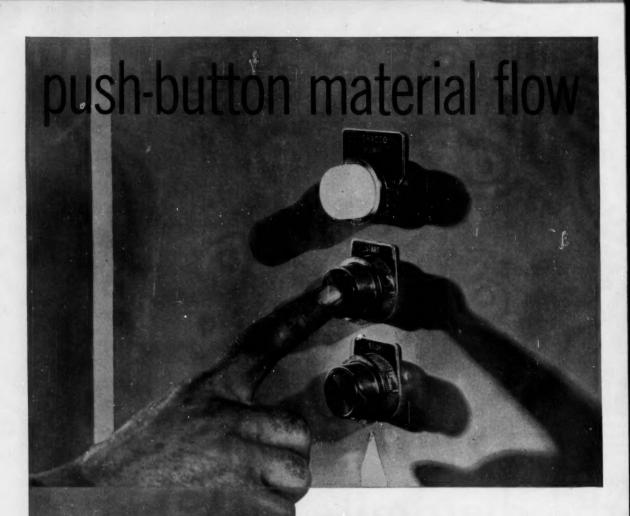
nationwide network of warehouses, you're assured of fast, sure delivery.

So, if filtration belongs in your processing operations, it will pay you to call in your local J-M Celite engineer. Backed by Johns-Manville's research facilities and years of practical distomite experience, he can help you with your filtration problems. Call him today or write Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its distomaceous silics products.

Diatomite Filter Aids





Airstream Conveyors permit close integration of bulk handling with production

Companies planning integration of dry bulk materials handling with production should consider the many advantages offered by Dracco Airstream Conveyors.

Airstream Conveyors are readily adaptable to control. Any degree of automation is possible—one man at a centralized panel can control all phases of even the most complex handling system. Movement of materials is smooth and swift—processes are tied together into a single coordinated operation with no waste motion.

Airstream Conveyors can perform a wide range of bulk handling functions: (1) moving raw materials from transport to storage and from storage to process; (2) moving intermediate stage materials from process to process; and (3) moving the finished product from end of process to packaging or bulkloading. In addition, materials enroute from point to point may be weighed, batched or blended without halting flow.

Airstream Conveyors can handle any dry bulk powdered or granular material at almost any desired handling rate. They are completely enclosed, sanitary, self-cleaning, dust-free and easy to maintain. To find out more details on how Airstream Conveyors can be integrated with production in your plant, call or write Dracco today.

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Dracco Bulletin 529, "Austream Conveyors", contains detailed information on equipment and uses. Shows examples. For your copy, write Dracco today.

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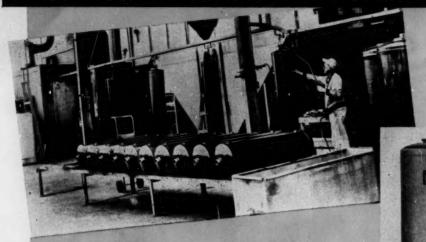
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Plastic coating guards water softener tanks against corrosion

HERE'S HOW...

THE ROPER MANUFACTURING CORPORATION of El Monte, California, needed a tough, dependable anticorrosion lining for tanks used in water treatment. They decided to test a promising coating formulated from Epon 1007 and supplied by the Trail Chemical Company of El Monte.

This Epon resin-based coating, applied to steel panels, easily survived severe tests for metal adhesion and thermal shock. Immersion tests showed that it resisted organic chlorides, detergents, salt spray and acids at both room and elevated temperatures.

Finally, two test panels were taken from an autoclave in which they had been held for two years. The first panel—coated with a high-quality porcelain—showed large rust spots, while the Epon resin-based coating on the other panel was still intact. Small wonder that Roper has now standardized on Epon resin-based coatings to line their wate softener tanks. More than 30,000 tanks have been delivered, with no complaints to date.

If you have a product finishing problem, consider solving it with Epon resin-based coatings. They have excellent adhesion, resistance to abrasion and impact, plus the ability to withstand heat, humidity and the attack of corrosives. You can call on our sales offices for the names of Epon resin-based coating formulators. Write for your copy of "Planning to Paint a Pyramid?"

SHELL CHEMICAL CORPORATION

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Business

Newsletter

CHEMICAL WEEK
September 15, 1956

There'll be another new uranium ore processor. As a result of a just-signed contract with the Atomic Energy Commission, Sabre Pinon Uranium Corp. will erect a 1,500 tons/day ore processing mill in McKinley County, New Mexico. Expected cost: \$14 million. Add to this the flock of other contracts already signed with AEC (CW, Sept. 8, p. 41), and you see how much broader a base there will soon be in uranium processing.

But this question of how broad the uranium industry is may make trouble for Sabre Pinon on another ground. A group of SP stockholders has complained to the Justice Dept. about the agreement under which American Metals Co., Ltd., would buy a 25% interest in SP, give it know-how and engineering help in constructing the uranium plant and be its cosigner for \$12 million worth of loans. The stockholders feel that the arrangement would tend to increase American Metals' alleged domination of the uranium industry. As a result, SP management is soliciting its stockholders to affirm their previous approval both of the agreement with American Metals and of the merger of Sabre Uranium Corp. and Pinon Uranium Co. into Sabre Pinon.

Meanwhile, AEC contracts will spur beryllium production. Brush Beryllium Co. (Cleveland) and Beryllium Corp. (Reading, Pa.) have both been awarded \$23.5-million contracts under which each will supply 100,000 lbs. of pure metal during each of the five years 1958 through 1962. Brush will erect a \$4.5-million plant next to its present beryllium copper alloy unit near Elmore, O. Beryllium Corp. will put up a new plant near Reading.

A new \$20-million chlorine-caustic plant is on tap for Wyandotte Chemical Corp. Wyandotte is now blueprinting a huge new unit at Geismar, La., to turn out 300 tons/day of chlorine and 330 tons/day of caustic soda, boosting total company production of these products by more than 50%. It's scheduled to go onstream by late '58.

The company will also up soda ash capacity by 32% at its Wyandotte, Mich., unit via a modernization program.

But DuPont has cancelled its expansion plans for sodium and chlorinated solvents units that were to be built at the company's Antioch, Calif., manufacturing complex. The company cites "economic reasons" for deciding not to go ahead.

And Goodrich-Gulf and Firestone reportedly have canceled plans for Orange, Tex., styrene plants. Reason: substantial styrene price cut by present producers on long-term contracts (CW Market Newsletter, June 23).

Reverberations from the rockslide in Niagara Falls, which destroyed Niagara Mohawk Power's Schoellkopf plant, are still rumbling through the city. Besides prompting Niagara Mohawk's impending hike in power rates (CW, Sept. 1, p. 23), the disaster may indirectly prevent

Business

Newsletter

(Continued)

industrial plants in the area, now set up for 25-cycle current, from getting sufficient future power supplies.

An interview with Niagara Mohawk officials revealed that the company may not restore all the 25-cycle generators destroyed in the slide, will put in 60-cycle equipment instead; "25-cycle power is on the wane," one NMP spokesman said. A serious cutback would mean that most of Niagara's industrial complex, which includes a big concentration of electrochemical plants, would have to start converting to 60-cycle current.

Reconstruction of the Schoellkopf power station is now under way. Niagara Mohawk has just launched the first phase of its rebuilding program by appropriating \$4 million to restore Section A of the plant, the part that was the least damaged. But four 25-cycle generators, formerly contained in the A section, will definitely be replaced by 60-cycle units. Sections B and C, which contained the large majority of 25-cycle equipment, were completely destroyed by the falling rock. No definite restoration plan for these sections has been announced.

Meanwhile, Pacific Northwest power users may have to curtail operations unless there is an "early and heavy" rainfall in the region. The warning from the Bonneville Power Administration to the 14 companies that have interruptible power contracts covering power for 18 plants in the area has become something of a yearly formality. To keep operating later in the year, the companies have the option of borrowing power available from water now stored in the huge Hungry Horse, Mont., reservoir or of buying steam energy as replacement. Either alternative would increase the companies' power costs.

Workers at Electromet's Ashtabula plant started back to work last Friday under terms of a three-year contract signed Thursday. Benefits total 45.6¢ for the three years, the same as that granted at the company's Portland, Ore., plant (see p. 48), but with higher cash wage boosts, less as fringe benefits.

In Brief—Rayonier Inc. has been granted a temporary permit to continue disposal of some waste materials from its Shelton, Wash., pulp mill into waters of lower Puget Sound; but the company will have to meet a long list of conditions to receive a permanent permit. . . . G. Frederick Smith Chemical Co. (Columbus, O.) has been ordered to stop making perchloric acid until city officials okay a safety report.

New opposition to the sale of Universal Oil Products stock came forward last week as three more independent oil refiners filed motions with the Supreme Court asking to intervene in the case. They join four other oil firms and the Independent Refiners Assn. of America in opposing the sale on grounds that it would cut off UOP research and development services now available to them and would seriously threaten a small firm's ability to compete in the industry (CW, Aug. 25, p. 20). Hearings on petitions to intervene began on Tuesday of this week.

Û

BRIEFS

for caustic soda buyers

Choosing a supplier New booklet New producing point



Some tips on supply logistics

Like all Hooker plants, this one in Montague, Michigan, is near deep water for a purpose—a purpose you might consider when choosing a supplier.

The water gives our customers the option of barge as well as rail delivery.

For many, the barge service means cheaper delivery. For others, it offers an alternative means of shipment in case of interruption in rail service.

Here are three other "pluses" to consider when you select a chlorine-caustic supplier. (As a Hooker customer, you enjoy all of them):

- 1. Competent engineering help. An experienced supplier can give you assistance in designing or revamping your chlorine or caustic soda handling system.
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- 3. Safety programs. Your supplier should be able to give you up-to-date advice on safe equipment and handling methods.

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pocket size, offers useful facts on buying caustic soda.

Besides information on forms, grades, and shipping containers, contents include a factual discus-

sion on 50% vs. 73% liquid caustic, and a handy nomograph to help you figure which strength is your better buy.

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Progress report... The most ardent sidewalk superintendent would take delight in the building of our new chlorine-caustic soda plant at North Vancouver, B. C.

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When it's completed early in 1957, the plant will be Western Canada's first domestic source of caustic soda and chlorine. Owned and operated by Hooker Chemicals, Ltd., it will provide shorter supply lines by rail and barge, and small but real freight savings. It will eliminate the need to pay duty on caustic soda and chlorine.

If your company has a plant or plans to build one, in British Columbia, this is a good time to find out how Hooker Chemicals, Ltd., can serve you.



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- ☐ Caustic Soda Buyer's Guide booklet
- ☐ Technical data on caustic soda

For information on these other Hooker chemicals, check below:

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Chemical Week

September 15, 1956

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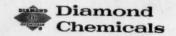
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Cigars and Multiwall Bags

Kraft Bag Corporation, as a manufacturer of multiwall bags, is in the same position as the cigar manufacturer who complained that everything to be said about his 25c cigars had already been said about 5-centers!



...but there is no doubt about the quality of the multiwall bags that bear the Kraft Bag Corporation stamp!



Our completely integrated plants and modern facilities producing every type of heavyduty valve or open mouth bag, are second to none!

As an exponent of true specialization, there isn't a single

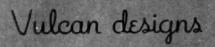
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If your product can be packaged in a multiwall bag — you can depend on us to make the bag to fit your product. Investigate
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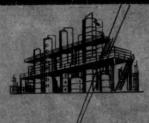
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For Catalytic Chemical Reactions involving





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These techniques can be utilized to considerable advantage in effecting component transfer from gas to solid (absorption), chemical reaction of solid and gas (such as one reduction) and gaseous, vapor or liquid reactions in the presence of solid catalysts (for example, oxidation reactions).

Vulcan's new Fluid Bed Reactors offer these advantages: Uniform operating conditions; consistent yields; maintenance of catalyst activity; simple heat recovery and safety of operation.

Vulcan's engineering experience in developing and designing processes for chemical and petrochemical plant operations ... including extensive pilot plant work in its own laboratories in both glass and metal apparatus ... can be applied to the adaptation of fluid bed techniques to your unique processing problems. We invite your inquiry.

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OPINION

Small Firms Use, Too

To the Editor: Your article on building chemical sales via house organs was excellent.

We can testify that an external publication is fully as effective for a small company as for the national organizations you interviewed. As a specialist in laboratory supplies and equipment, we use a four-page monthly newsletter to reach people engaged in research with briefs about new techniques, new equipment, and trends in the field.

We know it's read and that it boosts sales. Each issue contains a "Bargain Counter" section listing used instruments for sale, and usually these are sold 5 or 10 times over.

We're glad to know we're in good company.

J. O. BENGSTON
President
Chicago Apparatus Co.
Chicago

More Color in Industry

To the Editor: I was very interested in reading your recent article on how color is catching on in industry (July 28, p. 28). But I would like to correct one point, and this is where you state that American-Marietta Co, is not sold on the colorful approach.

Approximately a month ago, one of your associates phoned me . . . I did state that, although we had a color system for industry, it was our finding, particularly in the chemical field, that use of color for beautification was being forsaken for material that would give the greatest protection.

As I explained to your representative, many colors used in protective coatings are affected by fumes causing discoloration, which does not result in a breakdown of the paint film, but

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

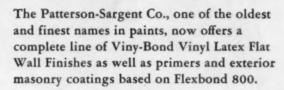


J. K. Fatterson, 2nd, Vice-President, The Patterson-Surgent Co.

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Dealers who push Patterson-Sargent paints with Flexbond 800 find that all-out consumer endorsement means profitable sales and repeat orders.

Our representatives will be glad to review with you the Daniel-Litter Laboratories report ... and show you what Flexbond 800 can do in your paint formulations. Write to Dept. A9



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KRONITEX MX has a viscosity of 65 centipoises thus providing the low viscosity necessary for plastisol compounds.

The end properties produced by KRONITEX MX plasticizer are valuable—in fact, necessary to many finished products. Always highly regarded for flame retardance, it also imparts long lasting permanence—resistance to oil extraction and rub-off—a minimum of high temperature processing loss.

The fast gelling and curing of compounds containing KRONITEX MX mean high production rates with most equipment.

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OHIO	☐ Send technical data.	☐ Send KROWITET WI sample.	-
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OPINION

does give an unsightly appearance, defeating the purpose for which color was used. In these cases, the chemical industry has gone to deeper colors, such as black and grays.

I think the attached piece of literature (*Dial-a-Tone*), which you will note was printed in 1948, as well as the article by our then technical director, M. J. Monahan, as appeared in the July '47 issue of *Crane Valve World*, substantiates the fact that we were one of the pioneers in the use of color in industry.

I. M. MACLACHLAN
Sales Manager
Valdura Division
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Chicago

SEE YOU THERE

Federal Wholesale Drug Assn., The Greenbrier, White Sulphur Springs, W. Va., Sept. 16-19.

American Chemical Society, national meeting, Atlantic City, N. J., Sept. 16-21.

Instrument Society of America, 11th national meeting, Coliseum, New York City, Sept. 17-21.

Materials Handling Institute, fall meeting, The Greenbrier, White Sulphur Springs, W. Va., Sept. 24-26.

American Oil Chemists' Society, 30th fall meeting, Chicago, Sept. 24-26.

American Institute of Mining & Metallurgical Engineers, Rocky Mountain minerals conference, Newhouse Hotel, Salt Lake City, Sept. 26-28.

Chemical Market Research Assn., Chateau Frontenac Hotel, Quebec City, Quebec, Sept. 26-28.

National Electronics Conference, 12th annual, Hotel Sherman, Chicago, Oct. 1-3.

European Federation of Chemical Engineering, annual meeting of process engineers, Hamburg, Germany, Oct. 1-3.

American Mining Congress Metal Mining-Industrial Minerals, convention and exposition, Shrine Exposition Hall, Los Angeles, Oct. 1-4.

Society of Cosmetic Chemists, Barbizon Plaza Hotel, New York, Oct. 4-5.

Antibiotics Annual Symposium, Willard Hotel, Washington, D.C., Oct. 17-19.

Assn. of Consulting Chemists and Chemical Engineers Inc., annual banquet and symposium, Hotel Belmont Plaza, New York, Oct. 23.

American Council of Independent Laboratories, 29th meeting, Savoy Plaza, New York, Oct. 28-Nov. 1.

Typical HARSHAW CATALYSTS

and How they are Used



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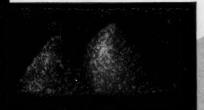
EXTRUDED



SPHERICAL



GRANULAR



POWDERED

"HARSHAW CATALYSTS"

DEHYDROGENATION CATALYSTS

CHROME-ALUMINA—available in powder or tablet form containing various percentages of chromium oxide supported on high surface area alumina—can be supplied as promoted catalyst and is also available as screened granules.

IRON—tableted iron oxide.

REFORMING CATALYSTS

MOLYBDENA-ALUMINA—supported molybdenum oxide on alumina—available as microspheres for fluid techniques, or as tablets for fixed bed application.

COBALT MOLYBDATE—a supported cobalt oxide—molybdenum oxide catalyst supplied in tablet form.

NICKEL-ALUMINA—a spherical catalyst available as hard spheres measuring 1/4" to 1" diameter—used for some types of gas reforming.

DESULFURIZATION CATALYSTS

COBALT MOLYBDATE—a supported cobalt oxide—molybdenum oxide catalyst supplied in tablet form.

ZINC OXIDE—a pelleted zinc catalyst used in the desulfurization of natural gas.

MOLYBDENUM SULFIDE—powdered and tableted molybdenum sulphide.

CHLORINATION CATALYST

COPPER—supported copper catalyst prepared and shipped as tablets or granules.

HYDROGENATION CATALYSTS

NICKEL-KIESELGUHR—supplied as unreduced, or reduced and stabilized, tablets, 1/6 to 5/6 diameter.

NICKEL-ALUMINA—available in tablet form containing nickel as nickel oxide on high surface area alumina, or in spherical form supported on low area, high-fired alumina.

RUFERT FLAKES—reduced nickel protected by hardened oil shipped as free-flowing flakes for hydrogenation of all glyceride and acid fats.

COPPER-CHROMIUM OXIDE—shipped as powder or tablets, stabilized or non-stabilized, with varying ratios of copper oxide to chromium oxide.

NICKEL-ALUMINUM—powdered 50:50 alloy used for preparation of active nickel catalyst for low temperature hydrogenation.

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ZINC CHROME—a tableted zinc oxide—chromium oxide catalyst used in the synthesis of methanol.

MERCURIC CHLORIDE—a granular catalyst consisting of mercuric chloride on active, granular carbon used in the synthesis of vinyl chloride monograp.

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COBALT—a supported cobalt catalyst in pellet form used in the synthesis of hydrogen sulfide.

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Whether your requirement is measured in tons or pounds Harshaw can produce your catalyst exactly to your specifications of raw materials, chemical composition, and physical properties such as length, diameter, crushing strength, abrasion resistance, and bulk density. AND, make delivery when you want it. Call on Harshaw today—for further information or technical assistance.

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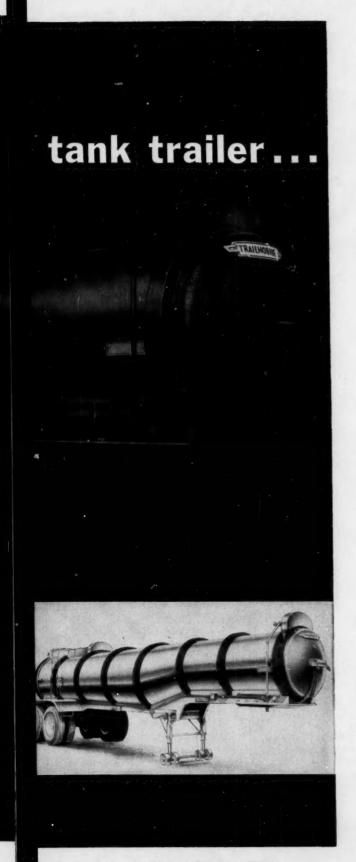
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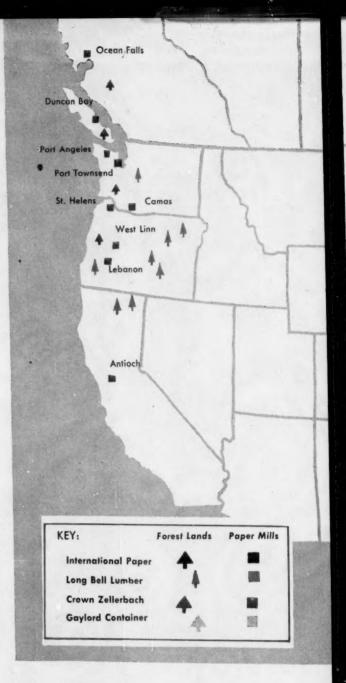
Cincinnati 9, Ohio • Springfield, Missouri Longview, Texas • Berkeley 10, California September 15, 1956

Chemical — Week

SETTING THE PACE IN PAPER

	Inter- national	Long Bell	Crown Zeller- bach	Gaylord
Converting plants	33	-	17	14
Paper mills	23	-	10	5
Forest lands (million acres)	21.0	0.5	1.5	0.5
Sales, 1st half '56 (million dollars)	435.2	49.8	223.5*	-

*Includes Gaylord.



Paper Producers Race for New

Prompted by big new demands for paper, America's two top pulp and paper makers, International Paper and Crown Zellerbach, are now blueprinting massive expansion programs that will quickly bring them into direct competition in many new areas across the nation.

Leaders in a vast movement by nearly the entire industry (which Standard & Poor's recently characterized as "probably the fastest-growing segment of our domestic economy"), both firms are spending large sums on new plants and new acquisitions to expand their operations to a national scale. And while they're not yet worrying about competing for buyers, they're already finding themselves with customers in common.

International Going West: International, traditionally an Eastern company, has budgeted \$116 million for expansion this year, hopes to spread

westward by acquiring Long Bell Lumber Co. and its holding company, Long Bell Lumber Corp. Directors of all three companies have already agreed on merger terms; stockholders will vote at special meetings scheduled for mid-October.

The Justice Dept. and the Federal Trade Commission have been investigating possible monopoly implications of the proposed merger, but most observers feel that antitrust action is



Markets

unlikely, that the merger would actually stimulate competition in the West.

Though Long Bell is strictly a lumber company—not a manufacturer of pulp and paper—it's a good bet that International will take advantage of its newly acquired timber holdings by putting up new mills and converting plants nearby, to enter the Western markets.

Turnabout: The International-Long Bell merger would follow closely a similar move by Western-based Crown-Zellerbach. Last November, CZ bought Gaylord Container Corp., thereby moving Crown's manufacturing sphere eastward in a big way (see map). This year, Crown's spending about \$1.4 million/week for expansion, has set aside another \$30 million for additions to Gaylord facilities.

Hence, both firms may soon have still more plants geographically close to each other, each trying for a share of local markets.

But Crown and International aren't alone in pulp and paper expansion. Many companies are building new

plants, joining in the scramble for new markets. Great Northern Paper Co. has just completed a \$45-million program that upped its newsprint capacity 40%, making it the largest domestic producer of newsprint. Rayonier recently finished a \$25-million expansion of its Jesup, Ga., mill, also acquired Alaska Pine and Cellulose. Scott Paper Co.'s acquisition of Hollingworth & Whitney and of Detroit Sulphite Pulp & Paper has made it a potent factor in all segments of the paper field. And there are many others. Admittedly, however, International and Crown are still one-two in over-all paper products production in the nation.

No Trespassing: For the time being at least, no paper company is going to suffer very much from an infringement on its present territory. According to recent industrial surveys, the market is big enough for all: total production of paper and paperboard for '56, estimated at 31.5 million tons, is expected to be used up. Newsprint is still very scarce and national demand is expected to exceed supply again this year.

On the other hand, there's no guarantee that demands will continue to rise, or even stay at present levels indefinitely. If there should be a general downturn in the domestic economy, the industry would certainly feel

it, since pulp and paper are, and always have been, sensitive to the fortunes of American business.

Price War? The capacity of all domestic paper and paperboard mills is estimated at about 33 million tons for 1956, or 7% higher than last year, and it will be substantially increased as many new mills go onstream. Moreover, present cost conditions make it imperative that paper mills operate at capacity or near-capacity levels to make adequate profits. Hence, a letup in future demand could touch off a hot price war. Commenting on the possibility of overproduction, CZ President J. D. Zellerbach stated recently that a price war could develop unless the industry is "wise about it." But leaders in the industry aren't worried about a possible cut in prices. Most of them now feel that, while there will be some overproduction by 1958, it won't be great enough to warrant any expensive cutbacks. And if a downturn in the economy does come, many producers think, expansion plans can be shelved accordingly.

In any case, present expansion thinking in the paper industry is on a large scale, and the widespread building program is coming on fast. Though present prosperity is somewhat tempered by the threat of future overproduction, most observers fail to see any immediate signs of a serious business downturn, which could bring on a surfeit.

AMERICAN CHEMICAL* INVESTMENT! ABROAD

(million dollars)

Here's how American money is backing chemical development in these areas:

	Canada	Latin America	United Kingdom	Western Europe	Other Areas	Total
1950	\$198.0	205.0	54.0	21.0	34.0	512.0
1953	275.0	326.0	84.0	30.0	53.0	768.0
1955	311.0	407.0	109.0	48.0	70.0	945.0

[&]quot;And allied products.

For Markets and Profits

U.S. chemical companies are in the vanguard of the growing army of American investors venturing abroad with their capital in search of new markets and good profits.

According to a new Commerce Dept. study of U.S. private foreign investment, chemical companies have been adding to their overseas holdings at an average rate of \$80 million/year since 1950, a rate in the manufacturing field second only to that of the motor vehicle industry. In Latin America, chemical money tops all other manufacturing investment.

U.S.'s total overseas capital in chemicals expanded from \$512 million in 1950 (see table) to \$768 million in 1953, and to \$945 million last year; and preliminary data for 1956 indicates that the trend is continuing. In addi-

tion, large sums have been invested in petrochemical production abroad by U.S. oil companies, on which specific data is not available.

Compared with other manufacturing investments, chemical holdings have climbed \$433 million since 1950; motor vehicle holdings, \$478 million; primary and fabricated metals, \$386 million; machinery, \$253 million; electrical machinery, \$215 million; rubber, \$204 million. Over-all, U.S. private investment in overseas manufacturing has jumped \$2.5 billion in the last five years to a total of \$6.3 billion at the beginning of 1956.

No Breakdown: Commerce Dept. has no breakdown on the kinds of chemical investments nor on who makes them. But officials figure that the big items are fertilizer plants, other agricultural and industrial chemicals, antibiotics and pharmaceuticals, and plastics of all kinds.

Chemical companies list a number of motives for putting their funds to work abroad:

- Profit margins are often handsome in foreign markets hungry for the newer chemical products.
- A foreign plant selling its products for soft local currencies will gain, in countries suffering from recurrent dollar shortages, a bigger market than could a U.S. company exporting for dollars.
- Labor costs are often less for products with a high labor content, such as for most synthetic organic chemicals.

Those considerations are becoming increasingly important to U.S. chemical concerns as competition from the revived European industry stiffens around the world.

[†]Direct investment at book value in foreign branches and subsidiaries.

Reichhold-Catalin: A Dead Issue?

The off-again, on-again Catalin-Reichhold merger is off again.

Last week as Catalin's management was putting stamps on a mailing of proxy statements by which stockholders would vote the merger, Reichhold's Board Chairman Albert Goetz telegraphed Catalin to say that the proposed financing was inadequate and unsatisfactory and that the deal was off

What motivated the call-off is still mystifying to a number of groups, but Reichhold President (and owner of 87% of the company stock) Henry Reichhold says it's purely and simply that his firm wasn't represented in the banking arrangements: "We were working closely for some time with [bankers] Blyth & Co. on the problems of converting Reichhold Chemicals into a publicly held firm. But we couldn't get agreement with Catalin, and the two other banking firms involved, to split the financial management three ways. When you make a move as important as this was to us, you want to be sure." But, he adds, RCI is ready anytime to renegotiate if it can get its own bankers in on the deal.

Another factor that's cropped up since the merger was originally announced is Catalin's declining financial condition, which would make a merger less attractive for Reichhold.

The Arrangements: Under the merger agreement, the new company would have had to raise \$12 million in new money: \$2 million in first mortage bonds, \$2 million in subordinate debentures and \$6 million in equity capital. Catalin thought a total of \$10 million was enough, but Reichhold insisted he wanted more to ensure a strong position for future financing. Reichhold owners would have received 2.8 shares of the merged company's common stock for each of their current shares; Catalin owners would have retained their current equity.

Merger negotiation between the two firms has had a turbulent history. The relationship has been filled with denials, surprise bids (for a directorship), approvals, disagreements, agreement to merge, cancelled merger plans, another agreement to merge and finally last week's cancellation by Reichhold. The previous cancellation was made by Catalin on the grounds that Reichhold's

accounting system didn't provide enough financial information on which to base an adequate merger decision.

To both companies merger would have meant considerable gains. Reichhold would have benefited by public ownership, diversification into polystyrene and the oil additives field, increased captive outlets for a number of its basic chemicals and substantial savings in distribution costs. Catalin would have strengthened its raw material position, found a toe-hold in foreign markets, and realized savings inherent in integrated production and distribution.

Chances for a future get-together seem slim. For one thing, the financial

Chemical Man at ODM

SWORN IN last week as new assistant director of the Office of Defense Mobilization, former Pennsalt Mfg. Co. President George B. Beitzell will direct a consolidation of ODM's formerly separate offices for production and materials. His functions include administering surveys of current strategic materials production in the light of mobilization requirements and defense essentiality.

houses who've spent time and money on the prospect so far would hesitate to pick up again. Catalin, too, feels it would be taking a chance to try again. Only Reichhold seems openly willing to pursue it further.

Catini Westbound?

Italy's chemical giant, the \$615-million-in-assets Montecatini Chemical and Mining Co., may be moving into the U.S. Catini has just revealed that it's thinking hard about building a U.S. plant; moreover, it recently made overtures to American investors in a \$15-million placement of stock (through American Depository Receipts) on the New York exchange.

Catini reportedly has been negotiating for possible construction near Huntington, W. Va., though "no final agreement has been signed so far. It's premature to discuss location, much less details of financial or partnership arrangements." At Huntington, survey groups have been making studies for several months near the Big Sandy River.

In Milan, well-informed financial sources believe Catini is exploring "a number of possible sites for a new plant to produce new synthetics under Catini processes." These processes could well hinge upon the work of Giulio Natta, who was in this country in June. Natta and Catini's managing director, Piero Giustiniani, tried to arouse interest in Natta's polypropylene work. Montecatini has exclusive rights to his work at Milan Institute. Other sources, however, speculate that the new plant would produce vinyl chloride and trichlorethylene.

To U.S. chemical firms the presence here of Catini would pose a potentially strong competitive threat, in view of the firm's significant know-how in aluminum, explosives, synthetic fibers, and resins, paints and varnishes, sulfur, fertilizers, weed killers and insecticides.

One indication of Catini's rising interest in U.S. activities was the release of part of its 84 million tightly held (by 200,000 shareholders) stock shares for U.S. purchase; now it's reportedly deliberating possibility of a 1-for-10 reverse stock split, which would price it here at an attractive \$40-\$50/share.

Washington Angles»

>> Three new tax regulations—the final word on how the 1954 Internal Revenue Code revisions will be applied to insurance firms and company unemployment insurance payments—emerged from the Treasury Dept. last week. That's a new mark in progress in the slow, tedious job of turning out new regulations. But it will be months yet before chemical firms will get final decisions on two proposed rulings closer to home—exemption for research and development expenditures and another covering pensions trust investments and testing for public safety.

IRS staffers have been reviewing industry comments on the latter since April, but are still a long way from agreement on what changes—if any—to recommend.

» One million dollars won't be enough—but that's the size of the budget hike Food & Drug Administration won from Congress this year. FDA officials are now telling businessmen that the agency will plunk for a "very substantial increase" next year, however, and are warning that reaction to the request will "determine to a large extent" whether the big expansion urged by the Citizens Advisory Committee will be achieved.

While seeking chemical industry support for

its budget request, FDÅ is also trying to break the united front of chemical and food groups opposing its version of the chemical additives bill by playing on the latter's fears of a "serious" public relations problem" if they continue to block FDÅ's bill.

**More access to technical reports may be the result of a move sponsored by the National Science Foundation to make it easier for scientists to get information in 20,000 nonsecret federal technical reports. The Library of Congress and the Office of Technical Services in the Dept. of Commerce will collaborate with NSF to set up the Government Research Information Program.

Scientists will be able to get lists of unclassified reports from the foundation's clearing house.

>> The hearings on fluorspar are postponed until Nov. 12. Domestic producers seeking mandatory curbs on the material requested the Office of Defense Mobilization to give them another 60 days to evaluate the effects of the purchase programs authorized by Congress. The hearings were originally scheduled for June, then were postponed until September.

Current feelings are that the government buying program might reduce the problems producers are complaining about.

EXPANSION

Carbon Black: United Carbon Co. will add four reactor production units to its Louisa, La., carbon-black plant. Current plant capacity is 300,000 lbs. /day. Cost of the new units: \$750,000.

Rare Earths: U.S. Yttrium has awarded a \$50,000 contract for construction of a rare earths producing facility at Laramie, Wyo. The new plant will utilize some of existing facilities of an old Standard Oil Co. refinery at Laramie.

Hydrofluoric Acid: Shea Chemical Corp., through a newly affiliated firm, will spend in excess of \$1 million to build a multiunit hydrofluoric acid plant on the Ohio River.

General Chemicals: National Cylinder Gas Co. will build a multimillion-dollar complex at Newport, Tenn., for the production of intermediate chemicals to be used in the cosmetic, auto finishes, pharmaceuticals and plastic industries. Construction of the plant starts this month.

Copper: Canam Copper Ltd. has started construction of a 2,000-tons /day copper ore processing mill on the Hope-Princeton highway 125 miles east of Vancouver, B.C. Cost: \$2.5 million.

Cement: Lehigh Portland Cement Co. is expanding its cement storage facilities at Metaline Falls, Wash. Cost: \$2 million. Completion is scheduled for Jan. 1, '57.

Ethylene Dibromide: Ethyl-Dow will increase its ethylene dibromide production capacity 20% at its Texas Division plant near Freeport, Tex. Completion: fall of 1957.

Pulp and Paper: British, Canadian and U.S. financial interests are reportedly going ahead with construction of a \$50-million pulp and paper mill at Lepreau, N. B., Can. Capital is to be supplied by Sir Robert McAlpine & Sons (London, Eng.) and Butler Co. (Chicago).

Graphite/Carbon: Union Carbide's National Carbon Co. will add an

additional 50-million-lbs./year capacity to its electrode production plants at Columbia, Tenn., Clarksburg, W. Va., and Niagara Falls, N.Y. Expansion plans announced in April also called for a 50-million-lbs/year increase.

COMPANIES

Mersey Paper Co. Ltd. is offering \$10 million worth of 5½% cumulative redeemable preferred stocks, par value \$50 for public sale. They are being offered at \$49.50. An additional \$25 million of 4%% 20-year first-mortgage sinking fund bonds has been privately placed with institutional investors in the U.S.

Ideal Cement Co. (Denver) will incorporate a Canadian subsidiary at Vancouver, B.C. The new company, which will be called Ideal Cement Co. Ltd., will be a wholly owned subsidiary.

Vanadium Corp. of America is offering stockholders subscription rights to \$10 million of 41/4 % convertible

Using Salt Efficiently

by INTERNATIONAL SALT COMPANY, INC.—America's largest producer of salt



You Can Save Money on Water Softening—With a "Lixator"

Today, a great many companies using zeolite water softeners are faced with this problem: While the water softener (which needs periodic regeneration with brine) gives excellent performance—regeneration is often costly, time-consuming, and causes substantial waste of salt. This is generally the case when salt is dissolved to form brine without the proper controls.

In most plants, however, it is possible to reduce this high cost of water-softener regeneration. The method is simple and effective: Always regenerate with pure, fully saturated brine—the type of brine made in a Sterling Lixator. Here are some of the reasons why Lixate Brine can save money for users of zeolite water softeners...

The Sterling Model Lixator is the most efficient and economical rock-salt dissolver ever developed. Wherever this fully automatic unit is used in water softening, it reduces the amount of salt consumed ... eliminates dry-salt spillage ... and simplifies the entire brine-making process. Developed and patented by the International Salt Co., the Lixator combines rock-salt dissolving and brine filtration in one simple operation. It delivers fully saturated crystal-clear brine automatically to any point within a plant. The Lixator is also remarkably easy to maintain, and has no moving parts to get out of order.

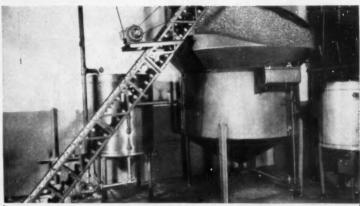
In operation, a Lixator need not replace the salt-dissolving tanks furnished by water-softener manufacturers. Instead, Lixate Brine is piped to these tanks which then serve as the storage and measuring tanks from which brine is withdrawn for use.



Salt handling reduced. Because Lixate Brine is piped to points of use, the work of hauling dry salt from storage piles to the location of the

water softeners is eliminated. Also, because of this direct-piping feature, the Lixator (and the salt that feeds it) can be placed anywhere in the plant, to make the most efficient use of available space. With a self-feeding hopper for salt, the Lixator operates automatically, without attention, and with little or no salt handling.

Lixators are made in a variety of types



At the Libby, McNeill & Libby plant in Hartford, Wisconsin, this Sterling Model Lixator is used for efficient, low-cost water-softener regeneration. A mechanical conveyor fills the Lixator hopper from a nearby rock-salt storage pile. In your plant, a Lixator can also produce substantial savings on salt—and in salt handling as well.

and sizes— to meet the brine needs of individual plants. The principle by which they operate can benefit the largest factory, or even a plant of moderate size.

Complete regeneration. Since Lixate Brine is always 100% saturated, it provides complete water-softener regeneration each time. This means that extra regenerations—with the consequent use of more salt—are eliminated. Still another advantage results from using Lixate Brine: Water-softener operators will not use any more of this brine than is needed for each regeneration. What often happens in the case of unsaturated brine is that excess amounts are used in an attempt at complete regeneration. In the long run, this always results in a costly waste of salt.

Keeps water softeners clean. Besides being fully saturated, Lixator Brine—produced in a Lixator from economical grades of Sterling Rock Salt—is also self-filtered, and free from insolubles or other foreign matter. As a result, it will not introduce dirt or other "clogging material" into the zeolite bed of the water softener. This has proved to be a particular advantage in industrial water softening—because the zeolite stays in good condition longer. Lixate Brine is also free from acids or alkalies. Thus, being neutral, it cannot adversely affect the performance of any zeolite water-softening system.



TECHNICAL SERVICE WITH YOUR SALT

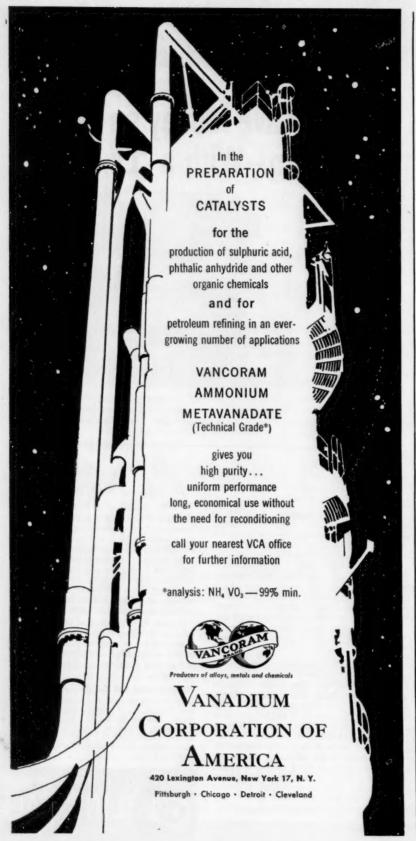
Through skilled and experienced "Salt Specialists," International can help you get greater efficiency and economy from the salt you use. International produces both Sterling Evaporated and Sterling Rock Salt in all types and sizes. And we also make automatic dissolvers in metal or plastic for both kinds of salt. So we can recommend the type and size of salt most perfectly suited to your needs.

If you'd like the assistance of an International "Salt Specialist" on any problem concerning salt or brine—or further information on water-softener regeneration—just contact your nearest International sales office.

International Salt Co., Scranton, Pa.

Sales Offices: Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N. Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa., Pittsburgh, Pa., and Richmond, Va.

STERLING SALT PRODUCT OF INTERNATIONAL SALT CO., INC.



subordinated debentures on the basis of \$100 of debentures for each 13 shares held. Priced at par, the debentures can be converted into common stock until they mature on Sept. 1, 1976, at \$52.75 per share. The company has also purchased a one-third interest in a group of 27 mining claims in the Long Park section of Colorado to provide it with additional uranium-vanadium ore reserves.

Aluminum Corp. of America has registered a secondary offering of 150,-000 common shares with the Securities & Exchange Commission. At recent market prices, the offering would have a value of some \$17.4 million. The shares are part of the holdings of Alcoa Chairman Arthur Davis.

Shareholders of the Owens-Illinois Glass Co. and the National Container Corp. have voted overwhelmingly in favor of merging the two companies. Completion of the merger is expected by Oct. 1.

Gillock Chemical Co. has been incorporated in Delaware with authorized capital stock of \$100,000.

FOREIGN

Pulp/Colombia: Container Corp. of Canada and Cartones Colombia will build a jointly owned pulp and paper factory near forest reserves 150 miles north of Bogota, on the Carare River. The new unit, to be called Empresa Colombiana de Papel, will cost \$600,-000

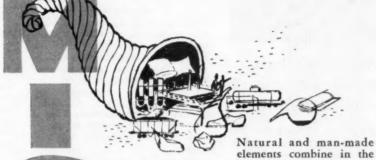
Foam Glass/Germany: First German plant to produce foam glass is now under construction in Taubenbach Thueringen (East Germany). The product is a light material, has a density about 4% that of glass. It is used for thermal and acoustical insulation. The plant is scheduled for completion by Dec. '56.

Acid Fractions/Germany: Oelwerke Germania (Emmerich) has just started commercial production of acids derived from vegetable oil. Highly purified products now being turned out include lauric, myristic, palmitic, stearic, behenic and arachidic acids. Mixtures of capryl-caprine acids as well as unsaturated 18-, 20- and 22-carbon acids are also being produced.

Sand of

the right place to locate your chemical plant

PLENTY



Natural and man-made elements combine in the Land of Plenty to create a formula for successful chemical plant location.

Excellent building sites in sizes especially suited to spread out chemical plants are available. They are near virtually unlimited supplies of the world's finest Bituminous Coal and pure limestone. Natural gas, petroleum, brines and other raw materials are plentiful, too.

In addition, with the chemical industry already well established here, there are numerous sources of basic raw materials for chemical processors.

The territory along the Norfolk and Western has many other advantages for the chemical industry. Why not let our plant location specialists tell you about them . . . in confidence and without obligation?

Write, Wire or Call:

L. E. WARD, JR., Manager INDUSTRIAL AND AGRICULTURAL DEPT. Brawer CW-731, (Phone 4-1451, Ext. 474) Norfolk and Western Railway ROANOKE, VIRGINIA

Transportation is a major factor in good plant location. YOUR TRAFFIC MANAGER is a transportation expert. Consult him about transportation advantages for your plant.

*

Abundant Mineral Resources

Adequate Power and Water

Home-Rooted Workers

Near Major U. S. Markets

Access to World Markets

through the Modern Port

Dependable N&W

Transportation
Friendly Communities

Room to Grow

Tax Structures

Favorable Industrial

of Norfolk on Hampton Roads

Moderate Year-Round Climate



Norpolkans Western

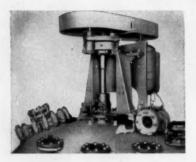
EXTRA FAST DELIVERY

of standard Pfaudler glassed reactors now!

Pfaudler

_Pfaudler Corrosioneering News Published by The Pfaudler Co., Rochester, N.Y.__

ANNOUNCING PFAUDLER'S NEW



With Pfaudler's standard glassed steel polymerizers...

NO NEED TO SPEND OR TO WAIT FOR SPECIAL DESIGNS

Pfaudler now offers you four standard reactors—engineered to give you adaptability to a wide range of services.

Experience in the engineering of all types of polymerizers has led Pfaudler to incorporate the best features in standard designs. You can now save money by ordering a 2000- or 3700-gallon reactor rated for either 150 or 200 psi and get faster delivery than you could hope for with special designs.

You benefit in many ways when you install a standard glassed steel reactor:

Assures purity

Since resins will generally tolerate no contamination, all surfaces in contact with the product are non-metallic — almost entirely glassed steel. Glass cannot discolor products or act as a catalyst to inhibit polymerization! Accordingly it improves purity, uniformity, and yields.

Easy to clean

Synthetic resins, which may cling to even highly polished metals, usually will not adhere to the smooth, hard surface of glass. Cleaning, then, is simple and fast — Pfaudler's new Spray Rinse Valve does it thoroughly without opening the vessel. The agitator speeds emptying through the off-center bottom outlet. The outlet valve has a spray ring for cleaning this point.

Money saving feature

Glassed steel is a less costly material of construction than alloys. The saving is especially significant when high pressure construction is required. Furthermore, expense and delay in special designing are avoided.

Easy to operate

Pfaudler's new demountable blade agitator has made possible a series of design improvements which result in more convenient operation of the vessel. The blades can be removed without disturbing the drive. Need for a large cover has been eliminated. Accordingly, the manhole has been made larger and moved nearer to the side. The position of nozzles in the top head is likewise more convenient.

Sensitive temperature control

Each standard vessel has been de-

signed for rapid flow on both sides of the heat transfer surfaces. This and several other features make possible temperature control within $\pm 1.0^{\circ}$ F.

The Pfaudler agitative system furthermore produces thorough mixing—and has been specifically designed to give uniform resin particle size.

Pfaudler manufactures a variety of corrosion-resistant reactors, of course, as well as other equipment widely used in producing resins. If your process requires special engineering, Pfaudler can help you. But before you spend and wait for a special design, check to see if one of Pfaudler's standard polymerizers won't give you the adaptability you need.

Drop us a line and get more information about these standard reactors. Ask for Bulletin 932.

A new glassed steel autoclave

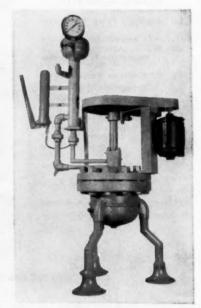
Handles reactions up to 750 psi

Your experiments with reactions involving high pressure and corrosive liquids have led to the development of a new, specially designed autoclave—now available to you at Pfaudler.

The new autoclave permits you to conduct reactions where internal pressures go as high as 750 psi with complete safety. Glassed steel construction prevents any undesired catalysis in the product from occurring. And you can study the reaction of highly corrosive liquids with the knowledge that no harm will come to the autoclave.

Since it is constructed of glassed carbon steel, the new autoclave gives you the corrosion resistance of glass and the structural strength necessary to withstand high pressures. Capacities are 1, 2, and 3 gallons.

You get a wide selection of agitation from the variable-speed drive the two-blade impeller agitator is glassed steel, too. Provision has been made for a thermometer well and



the nonmetallic rotary seal is equipped with pneumatic lubrication.

To find out more about these new autoclaves, write to us and ask for Bulletin 939.

Corrosioneering News Quick facts about services and equipment available to help you greduce corrosion and processing cost

FILM-TYPE EVAPORATOR

You can uncover areas of greater profit with this simple-to-operate still

Pfaudler has added an important new member to its growing family of products — a wiped-film evaporator for vacuum distillation.

It is a new improved evaporator which offers low-cost development opportunities to many industries e.g. chemical process, food, pharmaceutical, plastics, petroleum.

A floating carbon blade acted upon by centrifugal force cleanly wipes the peripheral evaporating surface to promote a very thin film and turbulence—creating higher heat transfer rates and faster evaporation.

Here are the benefits you get from using the Pfaudler evaporator:

 IMPROVED HEAT TRANSFER-Very high heat transfer rates even for highly viscous products due to turbulence promoting carbon blades.

2. SHORT CONTACT TIME—No deterioration for heat sensitive materials.

3. CONSTANT UNIFORM FILM — The walls are wiped by actual contact of the carbon blades. This is the only positive means of inducing controlled turbulence and uniform film thickness. Fouling and solids-build-up are eliminated.

4. LOW-COST PROCESS—Because of the

 LOW-COST PROCESS—Because of the short contact time, high heat transfer rate and low power consumption of this evaporator, your operation can be more efficient and less costly.

 SPACE SAVING – An internal condenser is built into the still eliminating an external condenser and interconnecting piping.

6. LOW MAINTENANCE RATE - Slow speed wiping minimizes wear. Closely ma-

chined tolerances between wall and wiper blades are not necessary because contact between the wiper and the wall is due to centrifugal force. Thermal expansion does not affect the operating efficiency of the wiper blades. No foot bearing is required.

7. LOW PRESSURE DROP — Pressure drops between evaporator and condenser as low as 1/10 mm Hg at one mm Hg operating pressure.

Two models available

Two Inch Laboratory Evaporator, complete with rotor motor, heating mantle, two 500-m.l. receiver flasks, batch-type feed flask, degasser, Teflon wipers, 24/40 standard taper joints.

For 115 volt, 1 phase, 50-60 cycle power \$391.00 For 250 volt, 1 phase,

50 cycle power. \$397.00
Twelve Inch Pilot Plant Evaporator, stainless steel, complete with ¼ HP variable-speed rotor motor, 4 sq. ft. heat transfer surface in jacket, 6 sq. ft. heat transfer surface in internal condenser, vacuums to 0.1 mm or lower, temperatures up to 700 F., very high capacities. For 220 volt, 1 phase, 60 cycle power. (Prices on request.)

Units may be coupled for fractionation. The distributor acts to accelerate the distillate through the evaporator—residence time is less than one second.

In many installations of both the laboratory model and the Twelve Inch Pilot Plant unit, the versatility and high evaporation rate of this new evaporator have been proved. And it has been found that the quality of results from these small units can be dependably duplicated in production size units.



It's easy to test your distilland yourself with the laboratory model. Data you gather will enable you to uncover those areas of greater profit in your own operation. For your needs at that time, Pfaudler offers standard jacketed units in 24-, 36-, 48-, and 60-inch production size models.

Order the Pfaudler Two Inch Laboratory Evaporator now.

Corrosioneers make impartial selection of column material



Equipment users and fabricators alike often ask themselves: What kind of a column is best here?

Users are in a position to be objective when deciding on one column or another. Pfaudler, too, calls on the same objectivity when planning

the fabrication of one column or another. Owing to their unique experience with both glassed steel and alloy, Pfaudler engineers can make impartial selections of materials.

Careful evaluation is given to each column application. Here are the criteria Pfaudler uses:

- Low cost and satisfactory corrosion resistance.
- 2. Easy handling, installation, and cleaning.
- 3. High vapor and liquid capacity.
- 4. Low vapor-pressure drop.
- 5. Top efficiency under high and low

loads and under mildly unsteady

Proper balance of these conditions is your best guide to a good column purchase. That balance might come from a tray or packed column, a glassed steel or alloy column – Pfaudler's engineers are as impartial in deciding as you are yourself!

tial in deciding as you are yourself!
No matter what kind of a column application you're planning, you can be sure that Pfaudler will help you to select the right column.

For information on Pfaudler columns, ask for Bulletin 940 and Data Sheet No. 25.

B.F. Goodrich Chemical raw materials



Piping that won't corrode; carries oil, acids, chemicals . . . made from Geon rigid vinyl

YEON rigid vinyl is an exceptional G material used by leading producers of pipe and fittings to provide cost-cutting installations.

Geon-made piping is immune to galvanic corrosion, eliminating the major source of failure in underground lines. It has superior resistance to oil, acids, alkalis, and most chemicals . . . including attack by sour crude oil, salt water and corrosive fumes.

The smooth interior surface of Geon vinyl pipe reduces frictional head loss, and inhibits the buildup of deposits...adding years of maintenance free life. You'll find the light weight and simple assembly of rigid vinyl piping provide important savings in freight, time, and labor.

For a new booklet on specific properties of Geon materials for rigid vinyl piping, write Dept. S-10, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



B.F.Goodrich/ GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

Charting

Business

CHEMICAL WEEK September 15, 1956

IT TAKES CHEMICALS TO MAKE METALS . . . HERE'S HOW MUCH:

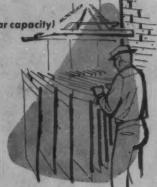
Estimated yearly consumption of selected chemicals



	(thousand pound
ACIDS (PRINCIPALLY	SULFURIC) 4.0
SODA ASH	35.0
SODIUM NITRATE	60.0
CAUSTIC SODA	85.0
SODIUM SULFATE	840.0
SODIUM CHLORIDE	1,500.0

ZINC a typical electrolytic plant (60,000 tons/year capacity) (thousand pounds)

CRESYLIC ACID 13.5 24.5 ARSENIC OXIDE **GUM ARABIC AMBER** 30.0 AMMONIUM CHLORIDE 75.0 COPPER SULFATE 145.0 SODIUM SILICATE 390.0



LEAD a typical smelting plant (18,000 tons/year capacity) (thousand pounds) AMMONIUM CHLORIDE FERROUS SULFATE SODA ASH CAUSTIC SODA SULFUR SODIUM CHLORIDE

HEMICAL manufacturers stand to C profit handsomely from this year's expected prosperity in the metal processing industry. Reason is that the smelting and refining stages of metal processing are big chemical consumers. Estimated annual spending for chemicals by a theoretical but average-size lead smelter,

zinc refinery and copper refinery: \$35,-000, \$70,000 and \$110,000. respectively. And total U.S. output of these metals is expected to top '55's. The comparisons: copper, 1.7 million short tons in '56 vs. 1.3 million in '55; lead, 572,000 tons, compared with 551,000; zinc, 1.1 million tons vs. 1.0 million.

3.3

7.1

34.7

55.0

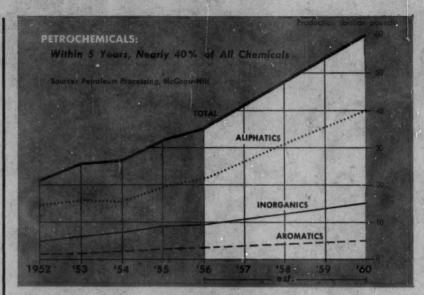
86.0

103.6

Charting

Business

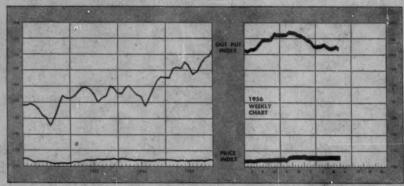
(Continued)



PETROCHEMICALS today constitute 24.5% of all U.S. chemical output. But within five years, this may well jump to 40%. Predicted petrochemical production breakdown for 1960: aliphatics, 40 billion lbs.; inorganics, 15 billion lbs.; aromatics, 5 billion lbs. One-chief growth factor: plastics' increased

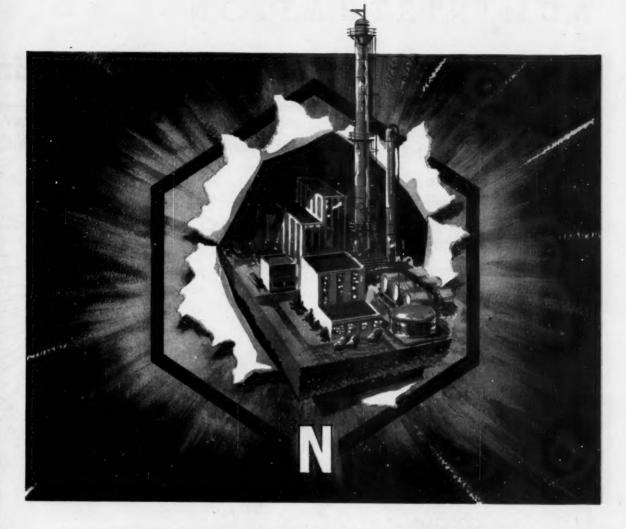
importance in the construction boom. They're the fourth largest petrochemical consumer (15% of total in 1955, probably 30% by '60). Other important outlets for petrochemicals: synthetic rubber (20%), automotive and aviation uses (16%), synthetic fibers (16%). Fertilizers, synthetic detergents are big users.

BUSINESS INDICATORS



WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week Output Index (1947-49=100)	172.7	173.1	163.1
Chemical Week Wholesale Price Index (1947=100) Stock Price Index of 11 Chemical Companies	105.8	105.5	104.5
(Standard & Poor's Corn)	477 3	1670	4907

MONTHLY Foreign Trade	Exports		Imports	rts		
(million dollars)	Latest	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, total	114.5	106.8	86.2	18.9	22.6	19.7
Coal-tar products Industrial chemicals	8.1 16.5	15.4	5.8	4.1 7.1	4.2 8.0	3.8 6.4



REILLY ... FIRST IN THE PYRIDINE FIELD

Synthetic Pyridine is one of the most fascinating fruits of Reilly research.

A few years ago many of the Pyridines were merely test-tube curiosities in our research laboratories—today they are basic tools for fashioning new products.

Now available in commercial quantities at competitive prices, these versatile organic chemicals and their derivatives are growing in importance daily.

If your field of interest concerns pyridines or their derivatives, we can make a contribution to your operation.

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REILLY TAR & CHEMICAL CORPORATION

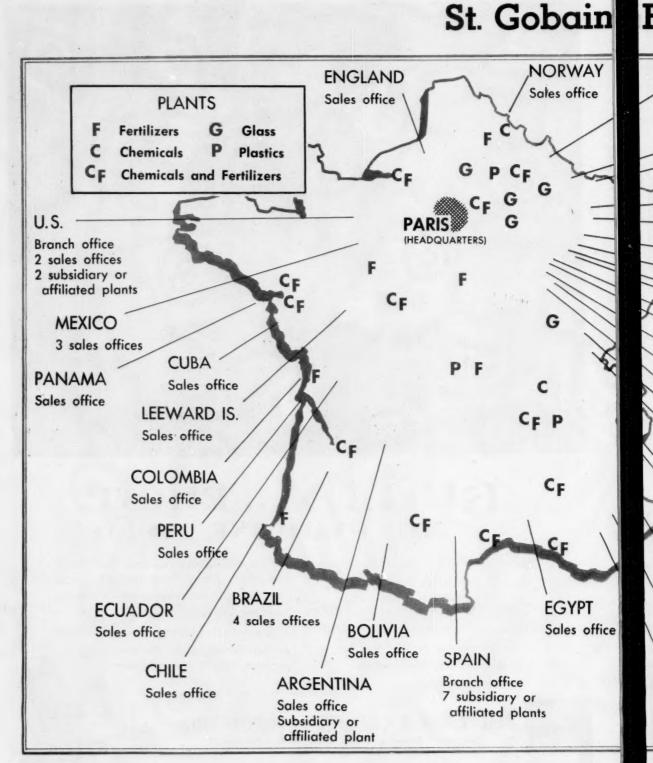
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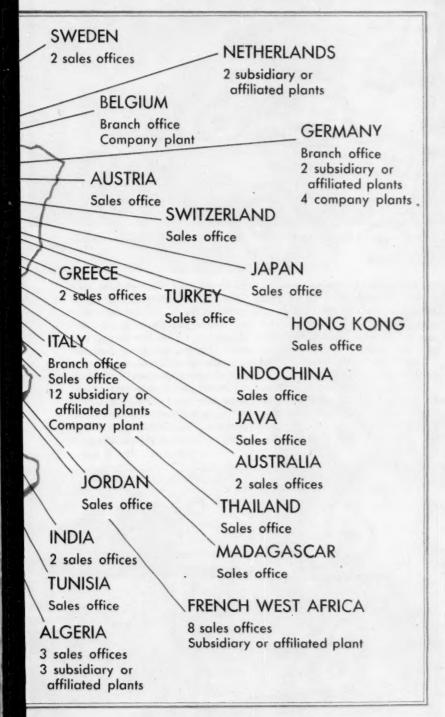
HETEROCHEMICALS · COAL TAR CHEMICALS

ADMINISTRATION

St. Gobain



French Accent in U.S. Chemicals?



St. Gobain—leading French producer of glass, chemicals, fertilizers and plastics—is rapidly becoming a force to be reckoned with on both sides of the Atlantic.

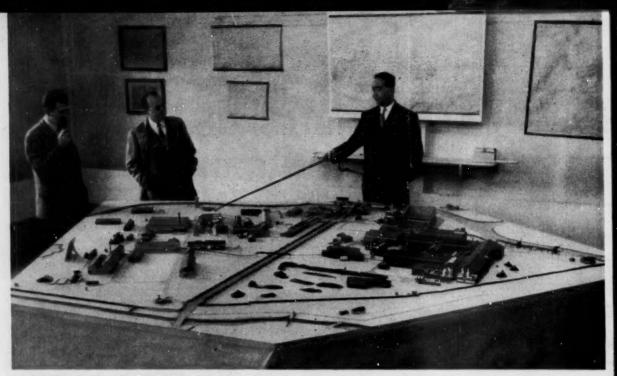
Evidence of this 291-year-old concern's impact on chemical process industries in North America can be seen in its ownership—partial in one instance, complete in the other—of two U.S. glass manufacturing companies, and in its licensing agreements for construction of U.S. and Canadian fertilizer plants under St. Gobain patents and know-how. Additional worldwide expansion has taken St. Gobain into Canada, Mexico and the Philippines with licensing agreements, and there are indications that this is just the beginning (see map).

To Break a Monopoly: What is now Manufacture des Glaces et Produits Chimiques de St. Gobain, Chauny et Cirey (St. Gobain) began-by order of Louis XIV-as the Royal Glass Factory in 1665. Object was to break the Venetian glass monopoly. In 1806, the glass firm decided to manufacture its own soda ash-to avoid dependence on outside sources-and the Chauny plant was constructed, launching St. Gobain's chemical activities. When, in 1807. Napoleon signed a decree authorizing the building of a dam and a water mill on the Oise River, the Chauny plant became one of the largest alkali works in Europe.

In 1835, Chauny Director Joseph Louis Gay-Lussac—famous French chemist—developed the lead-chamber process for sulfuric acid.* When the Solvay ammonia-based soda ash process replaced the Leblanc sulfuric acid-based system in 1870, St. Gobain—with enormous quantities of sulfuric acid available—became the leading manufacturer of fertilizers, especially superphosphates. At the same time, the company developed sodium and chlorine derivatives—the first step toward the manufacture of plastics many years later.

Rapid Growth Follows: By 1875, "Still a principal Chauny product, now made by both contact and chamber processes under the direction of Production Chief Pierre Detroz

ce



CHAUNY MODEL: From a beginning in soda ash and a boost from Napoleon came one of Europe's largest plants.

the company owned two glass plants and four chemical plants in France, and had acquired numerous raw material sources. Foreign operations began in 1863 with the acquisition of the Stolberg glass works in Germany; its expansion into Italy, Belgium, Holland and Spain quickly followed.

In 1928, St. Gobain entered new fields—petroleum refining and distribution, and cellulose—through affiliated companies. Capitalization rose to 205 million francs divided among 410,000 shares. The following years saw the manufacture of optical glass (1930), phosphoric acid (1932), and glass fiber (1935). By 1940, capitalization was 450 million francs divided among 580,000 shares held by some 100,000 stockholders.

Postwar Rebuilding: World War II caused widespread loss to St. Gobain, but research continued—resulting in development of plastic products and a process for manufacture of granulated fertilizers. Next step was entrance into petrochemicals, which led to the creation of Shell-St. Gobain—leading French manufacturer of synthetic detergents.

During the past decade, St. Gobain has expanded at an even faster rate, is now capitalized at 12.5 billion francs (\$35.6 million). Company activities have broadened to include such products as plastics, gasoline, chlorine and

its derivatives, fertilizers, pesticides, organic chemicals, solvents and basic mineral products, plus a variety of types of glass. And St. Gobain is about to enter the atomic-energy field with the construction of a plutonium extraction plant for the French AEC at the Marcoule Atomic Center.

St. Gobain General Manager René Grandgeorge recently announced an impressive list of expansions—costing 7.4 billion francs (\$21 million)—that will result in a 50% increase in capacity for the Chauny phthalic anhydride unit, a tripling of chlorine capacity at the St. Fons plant, and an increase in capacity for organic acid derivatives, for the polymerization of vinyl chloride, and for sulfuric and concentrated nitric acids.

Worldwide Expansion: Of even more significance to U.S. chemical producers is the determined effort of St. Gobain to—in the words of Gerard de Piolenc, president, St. Gobain, Inc. (New York)—"continue to expand its mutu-



SUPERPHOSPHATE SHIPMENTS: Minimum in storage, maximum en route.



GENERAL MANAGER GRANDGEORGE: A mixture of expansion at home and licensing abroad.

U.S. CHIEF DE PIOLENC: His goal, more mutually profitable relationships with U.S. firms.



ally profitable relationship with U.S. industry."

This relationship will most likely continue to take the form of licensing activities and investments in U.S. companies. St. Gobain interests in U.S. firms are now limited to minority participation in Franklin Glass Corp. (Butler, Pa.), and complete ownership of the Blue Ridge Glass Corp. (Kingsport, Tenn.). It also owns half of American Security Co. (New York), which is engaged in patent licensing in the field of flat glass tempering.

The firm's recent licensing activities include Northwest Nitro-Chemicals, Ltd. (Medicine Hat, Alta., Can.), for production of fertilizers; Atlas Consolidated Mining and Development Corp. (Cebu, Philippines), for the production of acid and fertilizer; and Sociedad Abonos de Monclova (Coahuila, Mex.), for the production of ammonia, nitric acid, and fertilizers. St. Gobain engineered and built the process machinery in these plants. In addition, St. Gobain says it has just signed a licensing agreement with "a very large U.S. chemical company" that wants to make its own announcement later.

St. Gobain also produces under license from U.S. concerns, has made



GUY CHAUVIERE, asst. director at Chauny, where Gay-Lussac made history.

polyester resins for over a year under license from American Cyanamid. SISS—a St. Gobain subsidiary—in which Dow Corning (Midland, Mich.) has an interest, manufactures silicones in France under Dow Corning patents. SOVIREL—another St. Gobain subsidiary with Corning Glass interest—has been manufacturing TV tubes in France for about a year.

As of now, fertilizer process licenses appear to be St. Gobain's most promising field in the U.S. The company has agreements with Fluor Corp., Ltd. (Los Angeles), under which Fluor engineers build fertilizer plants under St. Gobain patents and know-how, and promote the sale of these installations.

But St. Gobain's determined drive to become a significant factor in U.S. chemical production will not be limited to fertilizers. The firm plans to increase its licensing activities with respect to organic chemicals, glass products, and its bulk polymerization process for polyvinyl chloride—which has received considerable attention in this country.

St. Gobain has had a habit of making history in France, now is out for a big role on the international stage.



Plugging Chemical Careers

CONTESTS are the current vogue among chemical process companies in their efforts to generate more student interest in chemical careers.

One of the newest is a \$16,000 competition sponsored by Victor Chemical Works (Chicago). Although students may not enter this contest, they'll be the beneficiaries. As planned by Victor President Rothe Weigel (center, above), Vice-President Morris Stanley and Assistant-to-the-President James Gillet. the contest calls for one-page letters on what industry should do to stimulate interest among high school students in becoming scientists or engineers. Twenty of the best letters will be chosen; each writer will nominate a 1957 high school graduate to be considered for the top awards: four \$4,000 college scholarships, each for four years. The best suggestions received in those letters will be passed on to industry.

Another writing contest is the "Scientist of Tomorrow" essay contest sponsored by Porter Chemical Co. (Hagerstown, Md.) for junior high school youths, with \$1,000 as first prize.

And Ciba Pharmaceutical Products (Summit, N.J.) backs up an American Chemical Society subsection's contest for local students by permitting winners—and other outstanding high school students—to do experimental work in Ciba's laboratories. Pictured (below): runner-up testing germination inhibitors



LEGAL

Offshore Jurisdiction: U.S. Attv. Gen. Herbert Brownell has struck the latest-but certainly not the lastblow in the government's battle with Louisiana to determine jurisdiction over disputed offshore areas rich in oil and sulfur deposits. The Justice Dept. has asked the Supreme Court to declare the federal government the immediate winner "by default" in the long-standing controversy over the location of Louisiana's offshore bound ary. Observers have termed the move "probably ineffective," and in any event the likelihood of quick action by the high court is considered dim, because the court is not scheduled to reconvene from summer recess until October.

Brownell acted when the state failed to file an answer to the government's complaint within the 90-day period allowed by the high court shortly after the complaint was filed last spring. The Justice Dept. asked the court to declare the state boundary to be $3\frac{1}{2}$ miles offshore. Louisiana—claiming it's $10\frac{1}{2}$ to 38 miles out—has filed only a motion to dismiss the complaint.

This most recent government move came on the heels of an unsuccessful attempt by Louisiana and U.S. officials to reach a working agreement. The Louisiana group says the federal government won't agree to permit new drilling unless it can go ahead with new offshore leasing in the disputed area. The government's injunction against new drilling came after the state brought an injunction to block federal leases. Some 20 companies affected by the Supreme Court's order to cease both new drilling and new leasing have appealed—without success -for at least an agreement on drill-

Brownell's appeal for a default decision cited the plight of the oil companies affected, and also referred to two suits brought by State Atty. Gen. Jack Germillion in Louisianan courts to halt drilling and leasing offshore. Brownell charged. "The State of Louisiana appears to have no desire to develop the facts. Meanwhile, its other actions in this area are causing great confusion and expense."

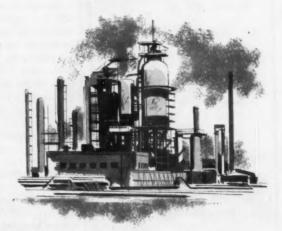
Armour vs. Crosby: Armour and Co. (Chicago) is seeking an injunction in Biloxi, Miss., federal court against Crosby Chemicals, Inc. (Picayune,

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ADMINISTRATION

Miss.), to prevent alleged infringement of a patented invention for distillation and treatment of fatty acids. The injunction also seeks an accounting to establish the amount of damages, and an assessment of alleged illegal acts against the defendant.

Clarence Desjardine, Cincinnati patent attorney for the defendant, told CW that Crosby Chemicals believes "the suit is not well founded, and the patents in question are invalid and not infringed." He added that the company plans a "vigorous defense."

LABOR

Unions Facing Probes: A number of labor unions that have collective bargaining agreements at some chemical plants are being investigated for alleged violations of labor laws and general business practices,

The large and powerful Brotherhood of Teamsters (AFL-CIO)whose Baton Rouge Local No. 5 has been conducting a stormy strike for recognition at the insecticide plant of Kan-Jax Chemical Co.-is engaged in a dispute before the Interstate Commerce Commission. ICC Chairman Anthony Arpaia and his colleagues are trying to determine the legality of the "hot cargo" device* used by the Teamsters to put pressure on employers. Over the Teamsters' objections, the agency has granted permission to the U.S. Chamber of Commerce to intervene in this case and present its argument that the hot cargo tactic is a secondary boycott. hence illegal.

In the Baton Rouge fracas, each side has accused the other of using violence in connection with picketing and has obtained a temporary restraining order from the state district court. The union says it represents about 85% of the company's approximately 90 hourly paid employees; the company says it will not deal with the union until it's certified by National Labor Relations Board.

Also in an unfavorable spotlight at the moment are the International Union of Operating Engineers and the Allied Industrial Workers (formerly AFL Auto Workers), both affiliated with AFL-CIO. While these unions have only a few chemical contracts now, they've both been cam-

*Involving refusal to haul goods of a non-union employer.

paigning for more of a foothold in this industry. AFL-CIO's executive council has called for formal investigation on reports of corruption within AIW, and it's likely that the Operating Engineers will be a principal target if the next Congress approves a proposal for a probe into alleged labor racketeering.

Settlements in the West: Presaging an end to the United Steelworkers (AFL-CIO) strike at Union Carbide's Electro Metallurgical Division plant at Ashtabula, O., both parties hammered out an agreement for a three-year contract at a smaller plant making similar products at Portland, Ore. This contract-paralleling this union's recently concluded pacts with the major steel companies-calls for a general wage increase of 71/2 e/hour for the first year and additional 7¢ boosts for the second and third years, with a number of individual job rate adjustments, a 52-week supplementary unemployment benefit plan and other benefits; the total package for the three years adds up to 45.6¢/hour.

Another West Coast settlement last fortnight was the three-year, no-strike agreement—signed at Oakland, Calif.—ending brief strikes by the Steelworkers at Kaiser Aluminum & Chemical plants at Spokane, Wash., and Baltimore. This contract was described as similar to those entered into last month by Aluminum Co. of America and Reynolds Metals Co.



COMMISSIONER ARPAIA: Crackdown coming on alleged union abuses.

S NITROPARAFFINS

NITROETHANE

CH3CH2NO2





NITROMETHANE

CH3NO2









1-NITROPROPANE CH3CH2CH2NO2







IMPROVING PROCESSES AND PRODUCTS



2-NITROPROPANE CH3CHNO2CH3









2-AMINO-2-METHYL-1-PROPANOL CH3C(CH3)NH3CH3OH











FOR AMERICA'S MAJOR INDUSTRIES













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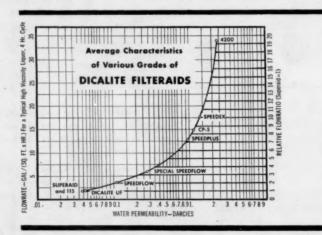
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ADMINISTRATION

KEY CHANGES

Marcus G. Van Campen, Jr., to vice-president, research, Cutter Laboratories (Berkeley, Calif.).

William S. Emerson, to manager, research, Research Laboratory (Whittier, Calif.), American Potash & Chemical Corp. (Los Angeles).

George H. Wagner, to assistant director of research, Linde Air Products Co., division of Union Carbide and Carbon (New York).

Charles L. Fleming, Jr., to vicepresident and director, Esso Research and Engineering Co. (New York).

Alden R. Loosli, to general manager; and C. W. Bendigo, to technical director, Fibers Division; American Cyanamid (New York).

John D. Zigler, to general manager, Plant Food Division, International Minerals & Chemical Corp. (Chicago).

Paul B. Sears, to director, Virginia-Carolina Chemical (Richmond, Va.).

RETIRED

Kenneth R. Brown, vice-president and director, Atlas Powder Co. (Wilmington, Del.).

DIED

Anderson W. Weaver, 76, founder and board chairman, Weaver Fertilizer Co. (South Money Point, Va.), at Farmville, Va.



Next Week

CW report authors analyze the \$245-million synthetic colors industry—burgeoning in some quarters, stymied in others.



Tiny chemical "shingles" of AERO* Stearate make waterproofing concrete simple and economical

AERO Zinc Stearate forms very small, shingle-like plates that are extremely resistant to wetting. They give large contact angles against water, causing it to be drawn up into drops on a concrete surface as shown above (left). Untreated surface (right) absorbs water.

Aero Aluminum and Calcium Stearates, while differing in particle shape and size, solubility and dispersing characteristics, also make effective waterproofing agents for cement and many other applications.

Only small quantities of AERO Stearates are needed to waterproof concrete. They may be added to the cement clinker before grinding, to the concrete mix at time of hydration, to cement water paints or used in spray form for coating concrete surfaces.

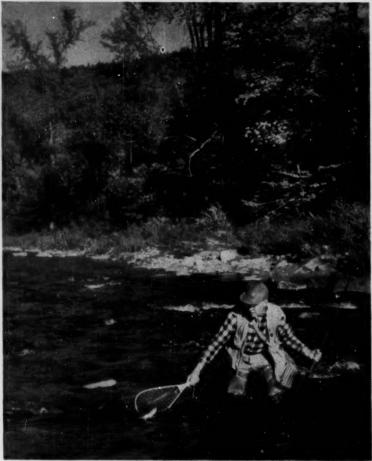
Aero Stearates also are widely used as dry lubricants, in powder metallurgy and ceramics. Aluminum Stearates offer good gelling properties for compounding greases.

Whatever the application, you can rely on Aero Stearates to give consistent, reproducible results based on the exceptional uniformity described in our Typical Analysis Sheets. Write for your copy.

*Trademork



SPECIALTIES



FISHERMAN AND BAIT: Specialties makers hope to hook part of the \$2 billion spent yearly by fishermen.



EWING GALLOWAY

Chemicals Help Boost the Catch

Oftentimes up before the crack of dawn, undeterred by traffic, weather or discomfort, fishermen are a hardy breed. They're also a rather numerous breed. According to a survey* by the Fish and Wildlife Service, to be published this week, some 23 million people in the U.S.—almost one out of five —fish for sport.

What's more, the average fisherman puts his money where his heart is. The FWS survey finds that last year, the average angler spent over \$90 on his sport. And that's the part that has nabbed the attention of chemical specialties makers. Within the past half-dozen years, a growing number of firms have been trying to help the

*The 1955 National Fishing and Hunting Survey, published by the U. S. Fish and Wildlife Service, Dept. of Interior, Washington, D. C. fisherman return home with something besides sunburn and mosquito bites to show for his efforts.

Fish Appeal: The majority of these specialties are designed to increase the bait's or fly's appeal to fish, or to lure fish over to where the regular bait will do the trick (see cut). Packed in bottles, tubes, and lately even aerosols, a number of products have been devised for bait application-for example, Doodle Oil, made by Davis Mfg Co. (Knoxville, Tenn); Fish-Nip, by Fish-Nip Co. (Hollywood, Calif.); Getzem, by Norkin Laboratories (Kansas City, Mo.); Liquid Beauty Bait, by Gille's (Green Bay, Wis.); Gipsy Fish Bait Oil, by Fisherman's Products (Birmingham); More-Bite, by More-Bite Co. (Oklahoma City); Liberty Lur-Oil, by Liberty Co. (St. Louis); Magicatch, by Dan Morgan Fisherman (Baltimore).

For the most part, these specialties appear to be composed of essential oils, which tempt fish; Liberty Lur-Oil is said to contain mulberry oil and has other odors. Getzum has a dispersing agent in addition to the attractant. In some cases, the oils are for specific fish, e.g., Liberty's Catnip Brand Catfish Bait, or Robert J. Kerr's Aerosol Odor Action, which comes in four different "flavors."

One of the most heavily advertised products of this nature is the Super Formula Lurene Bomb. This combines chemical and mechanical appeal—the hollow, perforated plastic body, about 2 in. long, is luminous (glows in dark



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37% Copper as metallic. Available in poly-lined drums or bags.

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Minimum 48% Manganese as metallic. Feeds, fertilizers, spray or dust grades.

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TENNESSEE



CORPORATION

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waters); it is filled with a dry component that releases a red dye when wet, as well as a powerful odor. The plastic unit and filler are made in Germany:

From the Ground Up: For the fisherman who not only has trouble finding fish, but also can't even locate worms for bait, there is specialty aid, too: Early Bird Chemical Worm Digger (made by No-Wilt Plant Products Co., North Olmstead, O.) and Kumup (Beck Products Co., Pittsburgh). These retail at about 60¢ for 3 oz.

Other phases of the angling operation are also covered by specialties makers. Weber Lifelike Fly Co. (Stevens Point, Wis.) provides a dressing for fly lines, nylon lines and the like, to waterproof and protect them, and it also sells oils and greases for reel care. Colure Co. (Des Moines) provides waterproof colors for painting wood, plastic or metal fishing lures—brushequipped bottles sell for \$2.95.

For the live-bait fisherman, Bava Co. (Detroit) is pushing a special vitamin capsule for the minnow bucket—one pill (they retail at 36 for \$1.25) is suggested for a gallon of water to keep minnows kicking or flipping for 24 hours.

Just how good these products are is still being debated by fishermen. The growing number of products indicates that many anglers are at least interested in trying them.

Fresh Market: To judge from the FWS study, which was produced by Crosley, specialties makers selling the sport-fishing market should aim first at the fresh-water fisherman. The survey shows some 18,420,000 fresh-water anglers in the U.S. They far outnumber the salt-water fishers (4,557,000), although they don't spend quite as much—averaging \$77.38 each last year, compared with \$107.29 by salt-water enthusiasts.

Naturally, the major portion of this outgo is for boats. Of the estimated \$1,914,292,000 total spent last year by fishermen, over \$550 million went for boats, and another \$243 million for rods and related equipment. Just how much was paid out for specialties hasn't been detailed, but it is regarded as being still pretty small; 23 million fishermen, however, are plenty of incentive for the attentions of specialties makers.



MECHANICAL BEE: New glue binds metal honeycomb in supersonic bombers.

Job for Speedproof Bond

Specialty adhesive makers are taking more than a casual interest in the new U.S. supersonic bomber, the XB-58 Hustler, that was trundled out of Convair's Ft. Worth plant last week. For the Hustler proves that resins for bonding aircraft structural members can be made to meet the rugged conditions of faster-than-sound flight.

From the outset, designers of the sleek four-engine medium bomber wanted to use resin-bonding in their craft. Its advantages—light weight, the fact that it eliminated such problems as "blind" riveting, didn't weaken parts with holes, and provided the only way of bonding the honeycomb structure used to stiffen wing panels—had already given it a vital role in such aircraft as the B-36, the B-52, and various fighter planes.

But supersonic flight presents special problems—a prime one is that of skin heat generated by air friction. Air friction actually heats the skin of planes to well above the boiling temperature of water—it will weaken almost all currently offered resins for metal-to-metal bonds. To whip this problem, Convair engineers turned for help to Shell De-

velopment Corp., which came up with a new epoxy-phenolic adhesive, Epon 422, that could withstand the high temperatures.

The new adhesive not only meets the immediate problem of heat-resistance, but also has permitted the use of bonded structures on the Hustler to a greater extent than on almost any other U.S. aircraft.

Old Novelty: Perhaps the bestknown resin bonding method for aircraft is the vinyl-base Redux system, which was worked out in England some years ago, and which has been used on such planes as the Comet jetliner. Redux is an "unsupported" adhesive; Epon 422 is supported by glassfiber tape. It can be used alone, however, to fill oddly shaped voids where honeycomb (see cut) would have to be expensively machined to fit.

The Epon 422 adhesive is sold with the catalyst added. To ensure reasonable storage life, the glue tapes, protected by a polyethylene film, are best kept under refrigeration. It is before use, the tape is cut to shape, the polyethylene removed, and the tape placed between, for example, the honeycomb

Bubbles with a man-sized job to do

Removing the grit and grime from a well-traveled automobile requires a cleaner with muscles. Leading synthetic detergents compounded with Atlantic Ultrawets can be made rugged enough to leave a clean, streakless shine on cars and locomotives, gentle enough for feminine hands and the finest fabrics. This is so because each of the Ultrawets has been specifically designed to do its cleaning job better.

The Ultrawets are only one member of the Atlantic family of petrochemicals (so you see a miniature oil refinery in the picture). Many new and profitable uses for these versatile Atlantic petrochemicals are constantly being applied in cost-cutting processes, in the development of new products and the improvement of wellestablished brands. For further information on Atlantic petrochemicals and service, write or wire The Atlantic Refining Company, Dept. H-9, at the nearest office listed below.

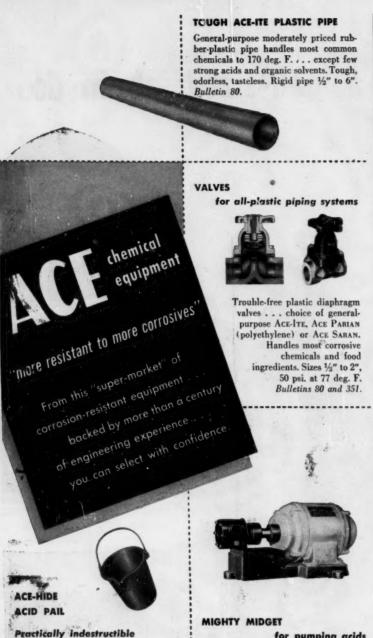




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SPECIALTIES

part and metal skin (both parts should be carefully degreased before bonding). From 3- to 25-psi. pressure is applied. and the adhesive cured at 330-355 F.

So far. Shell sees few markets outside the aircraft field for its temperature-resistant glue. But with the number of planes that fly at supersonic speeds increasing, there's bound to be a rising demand for adhesives that can withstand prolonged exposure to temperatures above 250 F.

New Steps for Nalco

A raft of new products, a new marketing policy, and a fivefold boost in capacity mark the opening of National Aluminate Corp.'s (Chicago) new plant this week. The \$1-million facility, with 12,000 sq. ft. of work space, can turn out some 75 million lbs./year of basic organic chemicals and formulations.

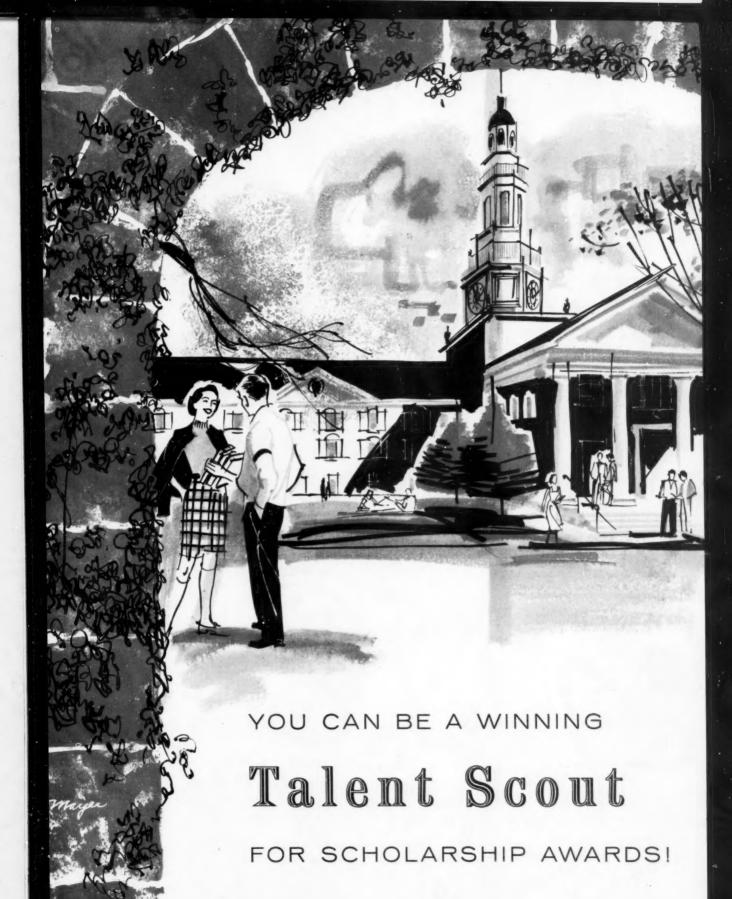
Big change at Nalco will be the policy of selling basic organics to outside firms—the company has long sold formulations (slimicides, antifoamers, corrosion inhibitors, boiler-water treating compounds), but up to now it has used all of the surface-active agents it has produced. Now, with added capacity, it plans to offer others this line of basic organic chemicals.

Prime item on the basic chemicalsfor-sale list will be the firm's long-:hain amines, called Nalcamines. These compounds can be converted into a number of other products, such as basic amine salts and quaternary compounds. Three Nalcamines will be marketed first, with six more on the way.

Nalco thinks one of the derivatives of its Nalcamines shows particular promise. It's a nitrite that gives "superior" bactericidal action, and it is made by first converting the amine into a chlorine-containing imidazoline, then converting the chloride into a nitrite. The resultant compound is noncorrosive in water solution, has strong germ-killing ability.

Twists in Latex Paints

Spurred on by the success of its jelled alkyd paints, Valdura Division of American-Marietta is now selling a jelled form of its latex water-thinned paint. Not a thixotropic material, the . new Rev Satin Jelled Latex paint nevertheless offers most of the advantages of the thixotropic materialsit won't spill, components won't settle



Victor's Talent Scout Contest

VICTOR CHEMICAL WORKS

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You can help guide a student's future.

We believe many of our friends would welcome the opportunity to help a deserving young person and at the same time help our country maintain its position of leadership in engineering and scientific development.

We recognize that the cost of a college education prevents some of the nation's talented high school graduates from pursuing their chosen fields in the sciences. This is a great loss to the nation and endangers our security.

Undoubtedly, many of you would like to be helpful and make it possible for some deserving young person to be selected for a four-year scholarship in science or engineering. Perhaps you know of several right now!

Victor is happy to make a modest contribution to help relieve this critical condition, and we are confident you will enjoy participating in this unusual opportunity to nominate someone of your choice.

Yours very truly.

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Rothe Weigel President



Four, \$4,000.00, 4-Year Science or Engineering Scholarship Awards!

You can nominate a high school graduate of your choice!

If yours is one of the 20 winning entries, some fortunate, deserving high school graduate can become your nominee and eligible for a \$4,000.00, 4-year Victor scholarship award.

If you send in a winning entry, you may nominate any 1957 high school graduate you wish. It may be your son, daughter, a relative or friend.

It's easy to win!

Write, in a one-page letter (not over 500 words), the kind of a program you think industry should adopt to stimulate the interest of high school graduates in becoming scientists or engineers.

Within a few minutes, you can probably think of several ideas which could be adopted by industry to help solve this acute problem. Just write a page letter giving your ideas for a program. Remember, writing ability is *not* necessary to win. Originality will count most in the final judging. That's all there is to do.

The 20 winning entries will have the honor of nominating a 1957 high school graduate of their choice, according to the rules sent at the time winning entries are selected.

Here's an opportunity for you to help maintain and strengthen the great American heritage of scientific and engineering leadership—possible only if each of us, in our individual way, does something to encourage the nation's talented young people. It's a chance for you to be a talent scout for the scientific and engineering leaders of tomorrow!

Each of the 20 winning entries will also receive a personalized, genuine leather attaché case.







See next page for contest rules and official entry blank

Here's all you do . . .

Write, in a one-page letter (not over 500 words), the kind of a program you think industry should adopt to stimulate the interest of high school graduates in becoming scientists or engineers.

CONTEST RULES

- 1 All entries will be based upon originality and the basic ideas presented. Writing ability is *not* necessary to win. All entries should be typed and must be accompanied by a properly filled-out Official Entry Blank.
- 2 All residents of the continental United States are eligible to enter, except students, employees of Victor Chemical Works, their families, or members of their advertising agency.
- 3 Each contestant may enter the contest one time only.
- 4 Entries will be judged by The Reuben H. Donnelley Corporation. The decision of the judges will be final. In case of ties, duplicate prizes will be awarded. All entries and ideas presented become the property of Victor Chemical Works.

- 5 Contest closes midnight, November 30, 1956. All entries must be postmarked not later than that date and received not later than December 14, 1956. Entries must be mailed First Class to: Victor Talent Scout Contest, P. O. Box 5767, Chicago 77, Illinois.
- 6 Winners will be notified no later than March 1, 1957.
- 7 If you are one of the 20 winners, you will earn the right to nominate a 1957 high school graduate of your choice for a 4year, \$4,000.00 scholarship in science or engineering.
- 8 Of the 20 graduates nominated, 4 will be elected for 4-year scholarships.
- 9 The 4 winning nominees will be selected by a committee appointed by the American Chemical Society. Nominees will be eligible on the basis of rules sent at the time the winning entries are selected.



Official Entry Blank

VICTOR TALENT SCOUT CONTEST

Name		14	
Address			
City	Zone	State	
Company			
Title			

Attach to your entry and mail to: Victor Talent Scout Contest, P. O. Box 5767, Chicago 77, Illinois

out. American-Marietta has applied for patents on its product, won't say exactly how it achieves the jel in its latex, but it does point to some ways in which the new paint is superior to the firm's previously sold latex paint: the new paint dries faster, in about 20 minutes, and is scrubbable in 24 hours; half-used cans of the new paint can be stored for considerable time without loss.

Koppers Co. (Pittsburgh), too, has come up with a new paint base. A styrene-butadiene material, called Dylex, is said to feature smaller particle size, increased pigment bonding strength, and better adhesion to a broad variety of surfaces than previously offered latex vehicles. It is also said to be extremely resistant to freezing and thawing cycles. The new material is available to paint formulators in 55-gal. drums and tank-car quantities.

For the Cornfields

Geigy Chemicals can't help showing its enthusiasm for its brand-new herbicide, Simazin, still at least two years from the commercial stage. Under field test in this country for the first time this year, the compound has already shown great promise as a pre-



More Against the Medfly

AS IF political upheaval weren't enough, Cyprus now has the Mediterranean fruit fly to worry about. The island, about 30 miles below the southern coast of Turkey, must export well over \$3 million worth of citrus fruit each year; the Medfly last year destroyed almost \$1 million worth. Within the next few

weeks, the Cyprus Dept. of Agriculture will launch its most vigorous campaign against the pest, employing the same kind of insecticide—malathion in sugar bait—that U.S. authorities are using in Florida, where the Medfly has recently been wreaking havoc. Above, a Cypriot farmer loads sprayer with solution.



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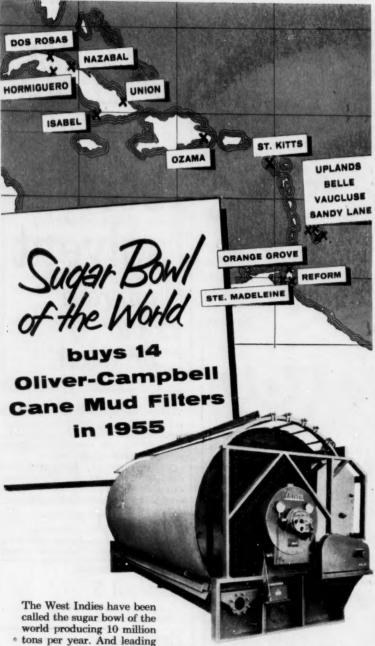
Espesol 6

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sugar factories here, as well as in other parts of the world, continue to install Oliver-Campbell Cane Mud Filters. In fact, 14 of these outstanding filters were sold in 1955 in these Islands alone.

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SPECIALTIES

emergence herbicide for use on corn. Early test results from several agricultural experiment stations demonstrate that 2 lbs./acre of the chemical effectively controls both broadleaf and grassy weeds.

Simazin is now supplied to test growers as a wettable powder. Experiment stations in the Midwest and West have been the first to register their results, and these have been uniformly favorable. Corn can apparently withstand up to 16 lbs./acre of the compound—eight times the normal usage—without damage. There also appears to be reduced danger of drifting herbicide damaging neighboring crops.

Although the product—a triazine compound—is not yet sold commercially in this country, it is offered this year to farmers in Europe as a soil sterilant (usage: 5 lbs./acre). The technical-grade material used in the U.S. tests is currently being imported from Geigy's home plant in Switzerland.

Because Simazin is not yet commercial in the U.S., Geigy has set no prices here; but the firm's enthusiasm indicates that it can sell the product competitively with widely used herbicides, such as 2,4-D.

PRODUCTS

New Formula: Distribution of a new formulation of All, Monsanto's low-foaming synthetic detergent for automatic washers, began last week. The new material is said to offer a "unique combination of wetting agent and brightener." Monsanto calls its new product Super-rinse All, and the brightener-wetting agent combination, AE-160.

Rapid Action: A new silicone defoamer has just been marketed by Dow Corning Corp. Tagged Antifoam B, the new material is said to be fasteracting than previously sold silicone antifoamers, and to be effective at concentrations in the 3- to 30-ppm. range. Antifoam B is also instantly dispersible in aqueous systems and need not be stirred; it's resistant to low temperatures.

Safe Anticorrosive: No-Ox-Id Safegard is the new water-based, non-flammable corrosion preventive developed by Dearborn Chemical Co. (Chicago). An emulsion of wax in water, plus corrosion inhibitors, the



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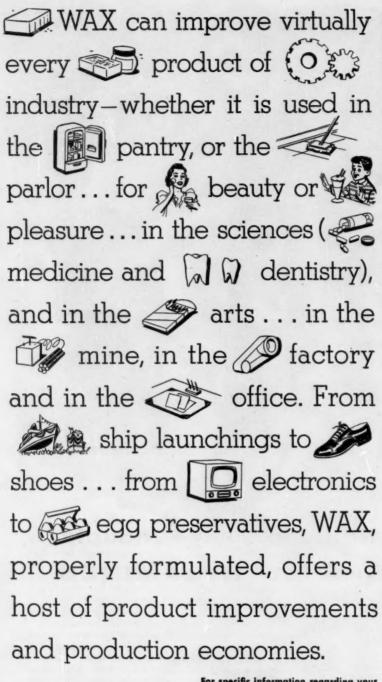


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SPECIALTIES

new antioxidant can be applied to all types of metal surfaces.

Paint Stretcher: The Arnex Chemical Co. (division of OLO Paint Corp. of Cleveland) has' a new liquid additive for coatings, called Arnex. When blended with standard finishes the product is said to decrease costs, reduce drying time and improve appearance. It's claimed to be effective on coatings for metal and wood, comes in five different formulations.

EXPANSION

Colloid Boost: Stein, Hall & Co., Inc. (New York), is increasing production of its line of Lycoid colloid products by 50%. Galacto-mannan products (incorporating materials such as guar gum, locust bean gum, and the like), they are used widely in the papermaking industry.

Add Two: Hercules Powder Co. (Wilmington, Del.) is moving into two new buildings, part of its \$10-million development plan initiated last fall. The new facilities will produce industrial and household items, and include a warehouse and a refrigerator building. The completed program will boost Hercules' productivity in these lines to 30 million lbs./year.

More Laminates: Lunn Laminates, Inc. (New York), has added 5,000 sq. ft. to its manufacturing facilities in Huntington Station, L. I., N.Y. The additional space houses molding, trimming and finishing operations.

PATENTS

Dye Stick: Hair coloring in stick form has been patented (British 749,045) by N. V. Indola. It consists of a base formed of fatty acids, a hydroxylamine and dispersing agent, to which are added aromatic diamines, aminophenols and their derivatives. The stick is moistened before use.

Exchanged Water: Delete, Hal Ellison's (Chicago) device for treating water, has recently been patented (U.S. patent 2,749,307). The unit, a plastic net bag containing ion-exchange resins and an indicator (which shows when the resins are exhausted), can be used to treat both washing and drinking water.



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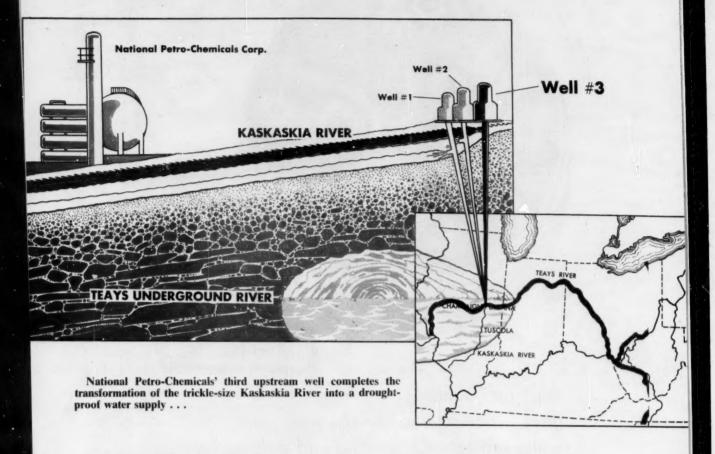
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PRODUCTION



To Slake a Prodigious Process Thirst

With the possible exception of raw materials, nothing is more important to a petrochemical plant than an adequate water supply. That's why the little Kaskaskia River at Tuscola, Ill., might seem an illogical site for National Distillers' huge National Petro-Chemicals Corp. and associated U.S. Industrial Chemicals Co. plants. But with the recent completion of a third well upriver, the Kaskaskia has been transformed into a vital natural viaduct leading from an almost inexhaustible underground reservoir.

Prolific source of Petro's vital water is the prehistoric Teays River (above, in color), which once dominated the water system of the North American continent, numbered the Mississippi as one of its tributaries. Forced underground by glaciers, the Teays still pursues its westward course through 10-mile-wide waterbearing strata underlying the central plains. At the

eastern end of its course, the Teays left a portion of its bed to the Kanawha River, which today supplies the heavy concentration of chemical plants in the Kanawha Valley.

More than Knowing Where: Right from the start, Petro planners knew that they'd have to supplement the Kaskaskia's erratic flow. Though normally sufficient to slake the plant's 6,000-gal./minute thirst, the river frequently dried up to a 120-gal./minute trickle during prolonged dry spells. Tapping the abundant underground Teays River 23 miles to the north was an obvious solution. But there's more to getting water than simply knowing where it is.

Clearing the Way: The first big problem Petro had to tackle was securing approval of its plan by the several agencies concerned with the regulation of water supply and waterways in the area. This proved to be a major task, involved negotiations with the State of Illinois, the Northern Illinois Water Co., two cities (Champaign and Urbana), three drainage districts and 10-15 individual property owners along the right-of-way.

Too, the company had to buck adverse public opinion. Many residents of Champaign and Urbana objected to Petro's plan, fearing that the added 10-million-gal./day drain would lower the supply, which also serves those cities. These objections were overcome, however, when drawdown measurements at observation wells proved that resources were even greater than had been anticipated.

The company incurred further obligations when it elected to transport the water via the Kaskaskia's twisting 40-mile-long natural bed. An alternate route—a 23-mile pipeline—had also been considered when water consultants disagreed on the amount of



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water that would probably be lost by evaporation and percolation along the natural route. Fortunately, the more optimistic estimates were correct, and actual losses have been less than 15% of the water pumped into the river bed.

Before it could use the river, however, Petro had to straighten out 1.7 miles of the winding bed, build 19 concrete headwalls to protect adjacent properties, and guarantee to maintain the river's natural cross-section by dredging.

Upon completion of preliminary arrangements, Petro sunk two 200-ft.-deep wells, started pumping 2,000-2,500 gpm. from each in June '53. Since that time, it has had to keep them in operation as little as one month in 1955, as much as 11 months

in an abnormally dry year. And though it has never run out of water, the company figures the recently completed third well is worthwhile insurance against even the most severe droughts.

Treating Problems: To handle the water at the plant end of the Kaskaskia, Petro constructed a 100-milliongal. reservoir and a water-treating plant (both of which, together with the Kaskaskia River supply system, were later sold to Industrial Water Supply Co.). The treating plant provides pure, chlorinated water for the plant's domestic water system, as well as softened water for process use and cooling systems. Cooling water requirements are 7 million gal./day of fresh water recirculated at the rate of 25:1. The reservoir also supplies untreated

water to the plant's emergency fire-fighting system.

While Petro's water supply system may be unique, its disposal problems were not (CW, July 31, '54, p. 17). When the petrochemical processing units went onstream, a higher-than-expected B.O.D. compounded by startup troubles threw a heavy load on effluent treatment facilities.

The treating plant installed to handle this load cost Petro close to a million dollars. Settling tanks were installed, 10 holdup ponds with a total surface of 42 acres were scraped out of the earth by bulldozers. Treated effluent from the plant now stays in the earthwork labyrinth for 18 days before being discharged.

At the outlet, Petro's used water has a B.O.D. in the range of 5-7 ppm.; its dissolved oxygen content is actually better than that of the river itself. And to make sure the treating system continues to do its job, water quality downstream is checked regularly by Petro, by Industrial Water Supply Co. and by the State Water Commission.

Meanwhile, the upstream pumping stations continue to upgrade the Kaskaskia's flow, stand ready to slake the plant's prodigious thirst regardless of the weather.

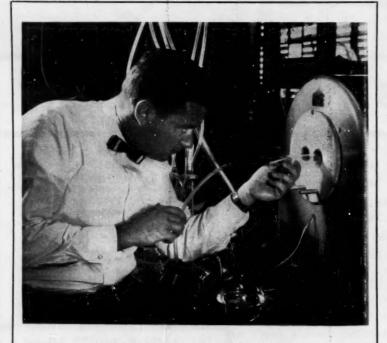
Burning Question

What causes metals to explode and burn? To find the answer to this poser, Atomic Energy Commission experts and metal producers are preparing to delve deeper into the conditions responsible for the sporadic outbreak of fires and violent explosions in metal plants—particularly those that handle zirconium.

AEC and metal manufacturers agreed last month on the need for a crash program to study the problem, are believed to be considering a contract with U.S. Bureau of Mines in Pittsburgh to conduct a short-range study.

Although some of the hazards contributing to metal fires are known, there's still a lot to be learned about basic mechanisms of spontaneous ignition and detonation. Many outbreaks are unexplainable, occur under circumstances that contradict knowledge of possible causes.

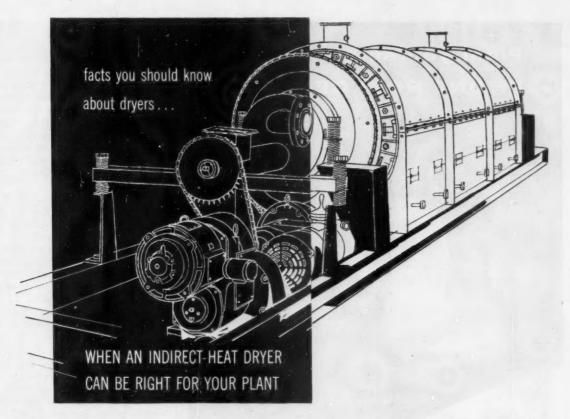
Clues Turn Up: That the mysterious causes of these fires and explosions



Lighter Touch for Transistors

A NEW microalloying process of Philco Corp. eliminates manual assembling of ultra-high-frequency germanium transistors. Engineer Richard Williams readies germanium blanks for processing (above) by placing them in tiny "boats" in a quartz tube, which is then inserted into a furnace. Particles of electrode

material are carried through the tube by a gas, diffuse into the germanium surface. The technique reportedly permits precise control of critical transistor dimensions, will be used by Lansdale Tube Co. (Spring City, Pa.) for mass production of new MAT and SBDT transistors.



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The records of this experience can often be applied to specific cases, possibly yours. For example . . .

Q. My material is a filter cake, practically all minus 325 mesh, and must not contact furnace gases. It can be heated to 500° F. at least, without injury. What type of dryer would do the job best?

A. You might consider using a directheat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heatcost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the

dust problem and the heat cost.

Q. What is meant by an indirect-heat rotary dryer?

A. One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

Q. How does an indirect-heat dryer minimize the dust problem?

A. In an indirect-heat dryer, only enough air is admitted to carry off the evaporated moisture. Thus, the air has nothing to do with the heating of the material. Generally, this low air velocity results in insignificant dust loss.

Q. How does this differ from the operation of a direct-heat dryer?

A. In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

Q. It seems I need an indirect-heat dryer. How can I get competent advice and more information regarding my particular requirements?

A. The Louisville Dryer engineering staff will be glad to analyze your requirements, arrange for necessary pilot plant tests, and submit an unbiased recommendation accompanied by estimated costs. You incur no obligation by using this service.



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PRODUCTION

will yield to study was optimistically predicted last month by Richard B. Smith, assistant chief of AEC's Safety and Fire Prevention Branch. Speaking at a Chemical Engineers Club luncheon in Washington, D.C., Smith claimed that some important clues had already been gleaned from the numerous theories that have been put forth as possible explanations of the outbreaks.

Some of the theories doubtless have been put to the test in Argonne National Laboratory's long-range research program, but details of this work are classified. Of more immediate help to metal producers and fabricators is the latest interim report on zirconium hazards issued by the Safety and Fire Prevention Branch.

Based on the information culled from numerous case histories, the report breaks zirconium hazards down into three general types:

- Spontaneous fires and explosions at low temperature appear to be largely—if not entirely—confined to finely divided powders or other forms, such as sponge, that have a very high surface-to-mass ratio. Powders (particularly those composed of particles of 3 microns or smaller) containing 16% or less moisture are considered especially hazardous, have been known to explode spontaneously even while under vacuum.
- Metal surface fires and explosions can occur on the surface of massivezirconium, regardless of the thickness of the metal. Best known cases in this category are the extremely rapid surface reactions that take place during, or immediately following, nitric-acid pickling of zirconium alloys.
- High-temperature zirconium-water explosions have not been experienced to date except under experimental conditions. This type of hazard is primarily of interest to zirconium producers who employ arc-melting in water-cooled crucibles of consumable zirconium electrodes.

Other sections of the report describe case histories of zirconium accidents, theories of possible causative mechanisms, and interim recommendations, for minimizing hazards of working with zirconium.

When all of the answers are in, predicts Smith, the knowledge that will help prevent fires and explosions should also provide new insight into basic corrosion mechanisms.





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- Liquid moderator is compact, easy to handle.

New Pair in A-Power

Atomic Energy Commission has given its approval to plans for the design and development of a nuclear-power system employing a unique combination of reactor components. The project: a \$5.5-million, 10,000-kw. power reactor being designed by Nuclear Development Corp. of America (White Plains, N.Y.) for the Chugach Electric Assn. of Anchorage, Alaska. The component combination: sodium-deuterium (heavy water). Total cost of design, development and construction will run to \$20 million if the project is completed.

Although the Chugach reactor will be the first to utilize this system, the sodium-cooled, deuterium-moderated reactor was one of the earliest systems considered for economical power generation.

NDA engineers predict that installations of this type will eventually be able to turn out electricity at a cost of 7 mills/kwh. in plants as small as 10,000-kw. capacity.

Also, says NDA, small plants can use uranium enriched to less than 1.5% U-235; sodium-deuterium plants of 50,000 kw. and higher will operate efficiently on natural uranium (with normal content of 0.7% U-235).

Multiple Advantage: Tops among the sodium-deuterium system's qualifications are the nuclear characteristics

of the two materials. As the coolant, liquid sodium metal offers excellent thermal efficiency, boils at such a high temperature (1620 F) that the system need not be pressurized. This obviates the need for placing the reactor inside a large pressure vessel, which would not only add to the plant's cost, but also complicate reactor repair and fuel-recharging operations.

As the moderator, heavy water efficiently slows neutrons released by fission of U-235. It's about four times as efficient a moderator as is graphite, permits a saving (over the latter) in volume of moderator required. Consequently, neutron volume is reduced, neutron flux is increased.

Another very important attribute of the sodium-deuterium pair is the long "burnup"—or fuel lifetime—it provides. Says NDA, the Chugach reactor will require new fuel only once every two or more years. And the burnup will deplete the U-235 content so completely that the spent fuel elements can be disposed of without costly reprocessing (to recover remaining U-235).

The system is also expected to burn up about 25% of the plutonium created (three Pu atoms for every four U-235 atoms destroyed).

Paving the Way: The sodium-deuterium reactor's late arrival on the nu-



what TRONA uality is doing about ontrol





Continuous monitoring means more than 400,000 separate quality determinations per month

Typical of AP&CC's company-wide quality control is the modern Quality Control Laboratory at Trona, California. Here, a staff of forty-four skilled technicians make as many as 55,000 separate quality determinations per month, in addition to the 345,000 by continuous monitors controlling process streams and finished products. Trace impurities, too small to measure by conventional analytical methods, are controlled by optical and electrical instrumentation. Tests for trace quantities of Sodium in chemical grade Muriate of Potash are made with ease and rapidity through techniques of flame photometry. Water solutions of Trona products are checked for color and turbidity by means of electrophotometers, resulting in Trona Boric Acid consistently meeting USP and BP quality standards. Constant checking with photovolt reflectometers helps maintain color of reflectance well above minimum guarantees, i.e.: current production of Lithium Carbonate at approximately 95% tri-green reflectance, Soda Ash guaranteed better than 99.5% Na₂CO₃, chemical grade Muriate 99.9% KCl, Anhydrous Borax better than 99% Na₂B₄O₇.

Why not give your own products the benefits of the built-in and controlled quality of Trona's broad line of basic chemicals for farm and factory?

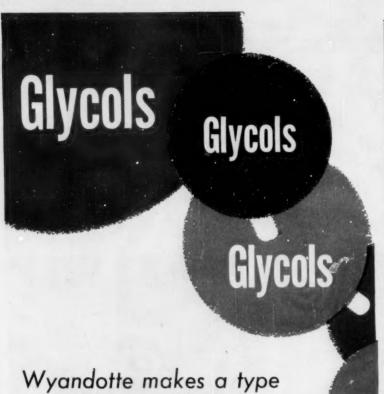
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Wyandotte makes a type for all these needs:

Generally speaking, glycols are thought of only as a base for permanent-type antifreeze formulations. Industry, however, has been finding numerous and interesting uses for them. ¶ Ethylene glycol, for example, is used for lowfreezing dynamite, and in the manufacture of cellophane for stronger, more pliable products. It is used, too, as an inhibitor and coolant, as a base for polyesters, as hydraulic fluid for brakes and shock absorbers, and in many other applications. ¶ Diethylene glycols are used as tobacco humectants, sizing agents, steam-set printing inks, yarn conditioners, softening agents for adhesives, in dehydration of natural gas, as plasticizers for composition cork, and in alkyds and resins. In addition, ethylene dichloride, and dichloroethyl ether are both widely accepted in industry. ¶ Wyandotte produces a variety of these glycols to meet every demand . . . we'll be happy to furnish you with information on any of them. Write us in full detail, telling

us about your product needs or processing operations. Wyandotte Chemicals Corporation, Dept. CW, Wyandotte, Mich. Offices in principal cities.



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CALCIUM CARBONATE • CALCIUM CHLORIDE • GLYCOLS • CHLORINATED SOLVENTS
SYNTHETIC DETERGENTS • OTHER ORGANIC AND INORGANIC CHEMICALS

PRODUCTION

clear power scene, says NDA, is duclargely to the earlier shortage of know-how. That it's now on the threshold of commercial reality is evidence that nuclear power has lent much impetus to the growth of sodium and deuterium technology.

Possibly the most significant breakthrough is the revolution that has taken place in the production of heavy water. Once scarce at several hundred dollars per pound, it is now priced by AEC at \$28/lb. for reactor use.

But of even greater interest—at least to power-short areas outside the U.S.—is the breakthrough of the sodium-deuterium reactor itself. For one thing, it means that highly efficient nuclear power plants may no longer be dependent on enriched uranium fuels, which are available only in the U.S., Great Britain and the Soviet Union. And for remote areas, such as Chugach's Alaskan site, it promises atomic electricity at costs competitive with those of hydroelectric plants, possibly cheaper than those of coal-fired generating facilities.

EQUIPMENT

Gasket Thermocouples: Thermo Electric Co., Inc. (Saddle Brook, N.J.), has expanded its line of miniature gasket-type thermocouples to include a wider choice of gasket sizes, thermocouple leads and lead terminals. Gaskets are standard SAE washers, come in 14 hole sizes from \(^{5}\sigma_2\)- to 1\(^{1}\sigma_1\)-in. and 10-, 14- and 18-mm. diameters. Temperature ranges: \(-300\) to 600 F, 75 to 900 F, 900 to 1,200 F. Thermocouple is locked in place on stud or bolt in area of temperature measurement, and entire assembly is covered with thermal insulation.

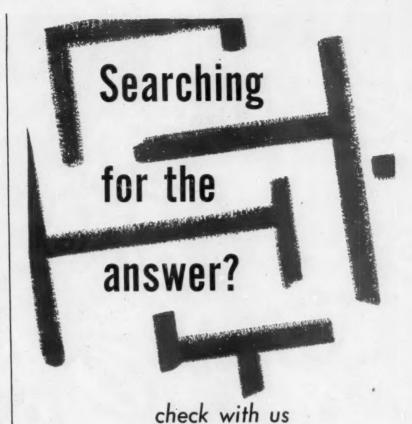
Water-Vapor Analyzer: Add to the growing number of moisture monitors (CW, March 10, p. 40) the Cenco Karl Fischer moisture "determinator" made by Central Scientific Co. (Chicago). Phillips Petroleum Co. has licensed CSC to make and sell this selfcontained, 22-lb., portable unit. Operators can analyze liquid, solid and gaseous samples without removing the basic apparatus from the case. "Determinator" uses the Karl Fischer method of either back or direct titration, has electrometric dead-stop endpoint, which eliminates the human element in detecting color changes and makes analysis of colored samples possible. Samples containing a few ppm. to over 50% water can be analyzed. Accuracy: plus or minus 10% in 0- to 100-ppm. range; plus or minus 0.2% in higher ranges. Operation requires 115-volt, 60-cycle current.

Cross-Bore Heat Exchanger: Delanium Graphite Co. (Elizabeth, N.J.) offers a new line of cross-bore graphite heat exchangers manufactured in England by Powell Duffryn Carbon Products Ltd. Each exchanger is made from a block of Welsh graphite through which parallel rows of holes have been bored on the process side; holes run at 90-degree angles in alternate horizontal planes for the service side. The block is held in compressive stress by cast-iron headers. The graphite is inert to most corrosive fluids, has high thermal conductivity. Twelve models range from 4 to 200 sq. ft. in effective heat transfer area, allow operating pressures to 100 psi.

Hastelloy Nails: John Hassall, Inc. (Westbury, N.Y.) has a new line of nails made from Hastelloy alloy C. These nails offer high corrosion resistance to chemicals such as nitric, acetic, formic and sulfurous acids, free chlorine, hypochlorite and chlorine solutions, acid solutions of ferric and cupric salts.

Acid-Handling System: Safety in handling and diluting acid from carboys and drums is the aim of Graver Water Conditioning Co.'s (New York) Graver vacuum acid-handling system. A water-type ejector creates a vacuum to draw acid from the drum to a measuring tank, obviates lifting and applying positive pressure to drum. When vacuum is broken, acid in the line draws back into supply source. Acid in the measuring tank is then ready to be drained to dilution tank.

Fire Extinguisher: Ansul Chemical Co. (Marinette, Wis.) is out with a new stored-pressure water fire extinguisher. Unit has 2½-gal. capacity, operates under air pressure at ranges up to 40 ft. Stream is released by squeezing the carrying handle—bouncing or inverting is unnecessary to activate the extinguisher—and stream may be cut off at will. The unit is pressurized to 100 psi. by any compressed-air source.

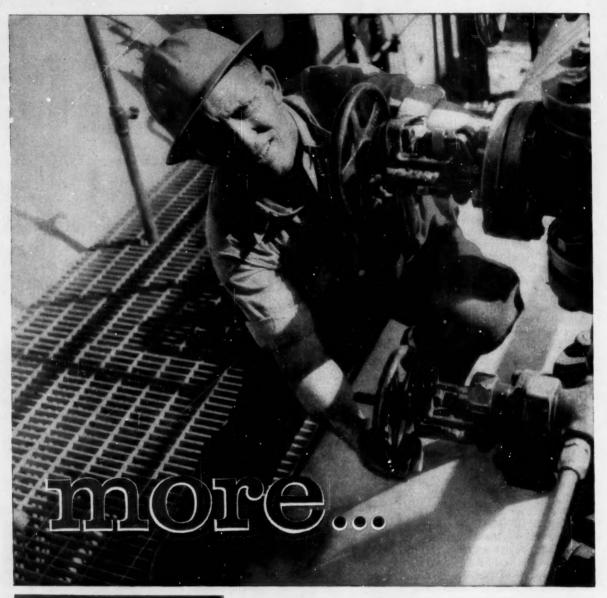


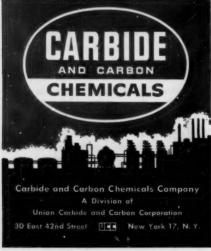
When groping about for the right answer to a problem, you naturally look to an approved, reputable source. So . . . when you are looking for specific and technical answers to problems involving chemicals, may we suggest that you try us? ¶ As a leading producer of chemicals for over 65 years, we've been able to come up with many of the right answers - to solve many problems for our customers. Perhaps we can help solve yours, too! ¶ Fact is, we pride ourselves in giving our customers the personalized service they demand and deserve: We have one of the most modern, up-to-date research labs in the country . . . our staffs include people dedicated solely to product research. Our skilled chemists and engineers can assist you in improving your manufacturing or processing operations. It might pay you handsomely to investigate us and our facilities. If you have technical problems involving chemicals within our manufacturing background, why not



write us about them in full detail? Wyandotte Chemicals Corporation, Technical Inquiry Section, Wyandotte, Mich. Offices in principal cities.

HEADQUARTERS FOR ALKALIES





NIACET vinyl acetate monomer

A large, new unit is now on stream at Texas City, Texas. This unit more than doubles existing capacity there and substantially increases national production of vinyl acetate monomer.

With this increased availability, you can count on Carbide to continue to meet your growing needs for vinyl acetate monomer. And you can rely on Niacet vinyl acetate monomer because it is produced by the pioneer and leader in vinyl monomers.

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The term "Niacet" is a registered trade-mark of Union Carbide and Carbon Corporation.

Technology

Newsletter

CHEMICAL WEEK
September 15, 1956

Two new Atomic Energy Commission programs aim at stepping up U.S. supply of nuclear-trained scientists, engineers and technicians. One provides AEC grants to nonprofit educational institutions (not more than \$350,000 each) toward equipment (e.g., subcritical or training reactors) for nuclear energy technology course work. The other makes certain materials (e.g., uranium trioxide and uranium tetrafluoride sources) available for use in such education and training. The value of materials loaned to any institution is limited to \$50,000.

Highlighting the nuclear manpower shortage is the absence of qualified takers for the top post at Argonne National Laboratory. Former Director Walter Zinn resigned seven months ago (although he remained in charge until July 1), plans to form General Nuclear Engineering Corp. near St. Petersburg, Fla. According to the University of Chicago, AEC's operating contractor at Argonne, the search to fill the purported \$20,000/year position is continuing.

Japan's Kokoku Rayon and Pulp Co. tells CW it will build its new polyester fiber plant on Kyushu, probably start operating it this fall. According to the company, the fiber utilizes waste water from sulfite pulp production. The water contains 10% lignin from which vanillin is extracted and processed into a monomer of 3-methoxy-4-hydroxy-ethoxy benzoic acid methyl ester. Polymerization of the monomer, followed by melting, yields a fiber that is more elastic than wool but less elastic than nylon, heavier and harder than nylon, lighter than cotton.

The Japanese government is enthusiastic about the newcomer's prospects, will contribute \$55,000 toward construction of the \$145,000, 200-300-kg./day pilot plant. If experiments are successful, the fiber may be offered commercially by mid-'57 at a hoped-for price of not more than \$1/lb.

Uncle Sam will help provide an international flavor to the conference on ozone slated for Chicago this November, Illinois Institute of Technology, which is running the meeting, is getting a \$5,000 federal grant to meet costs of bringing over eminent foreign scientists. A similar grant was extended to sponsors of the International Congress on Catalysis being held in Philadelphia this week.

Thirty-eight federal agencies currently spend over \$2 billion a year on scientific research and development, employ 130,000 scientists. That's the gist of a new National Science Foundation report which lists research units and installations of each agency, as well as government-financed research centers managed by industry or universities.

Private bidders for the Akron, O., synthetic rubber laboratories may find themselves bidding not only against each other, but against the government as well. The General Services Administration will ask all

Technology

Newsletter

(Continued)

government and independent agencies whether they need the facilities for research or any other purpose. Those interested will be asked to put a value on the laboratories for review by the Bureau of the Budget. Private industry bids will be invited later. GSA's questionnaire to the other government agencies is ready now, but not final approval.

Fertilizer producers and other phosphoric acid consumers may soon be switching to acid generated by burning phosphorus at point of use. The first installation of a small-scale furnace designed for efficient operation at moderate production rates is expected to be onstream Oct. 1 in the Monsanto-engineered phosphoric plant of Colorado Fuel & Iron Corp. (CW Business Newsletter, Aug. 18).

Monsanto is keeping the CFI unit under wraps, gives no hint of the size, construction features or operating principle that allows the increased efficiency at low production rates. Presumably, it will burn 24 tons of phosphorus per month to satisfy most of CFI's monthly need of 1,000 tons of 75% phosphoric.

By permitting moderate-size consumers to get in on the advantages of hauling 100% phosphorus instead of ready-to-use acid, says Monsanto, the new unit may be just the thing to make phosphoric as attractive as sulfuric acid for industrial processes. Monsanto will own the unit; CFI will operate it under a fee agreement.

Shell in England is building a pilot tanker to haul liquefied natural gas between Venezuela and the Caribbean. There's no connection between the project and the one of Constock, however (CW, May 12, p. 58). The Shell tankers will use aluminum with an insulation layer of balsa wood on the outside, rather than a balsa lining.

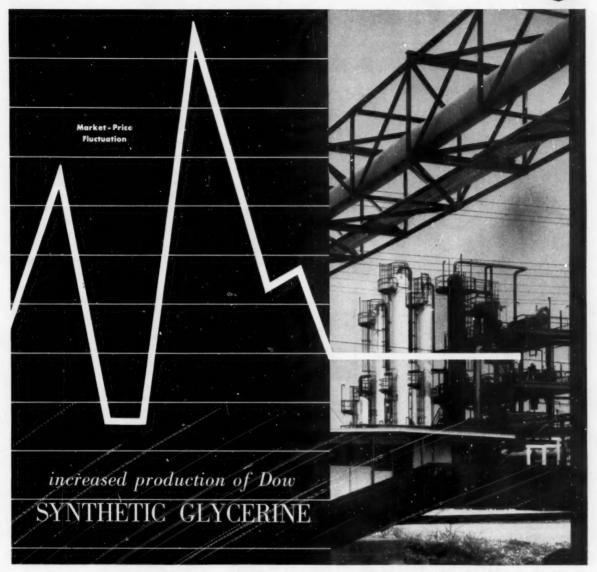
Now there's a nylon dyeing process worthy of the yarn. That, at least, is the claim Chemstrand is making for its Chemnyle process, introduced this week.

The process, it says, permits dyers to get the combined advantages of color fastness of direct or acid dyes with the uniformity of dispersed acetate dyestuffs.

The secret is to modify the dyes to give controlled dye absorption. According to Chemstrand, dyeing costs with the new method are not expected to differ substantially from those by present processes. It will be licensed to dyers and finishers.

Sinclair this week is starting the big promotional push for its new gasoline—with "Chemical X" added. When it announced the gasoline a few weeks ago, it declined to say anything about the nature of the additive. The company is still not talking, but chemical men are betting heavily that the agent is a phosphorus compound, not unlike TCP in its action.





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Perhaps you've been wanting to switch to synthetic glycerine. You look for the more uniform quality its controlled production offers.

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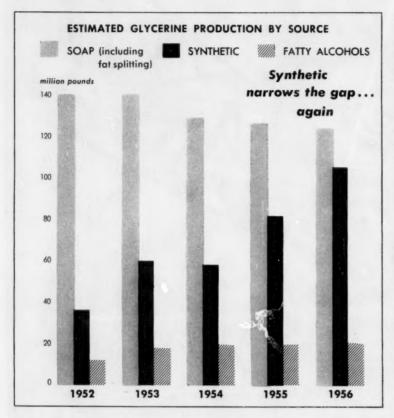
where price and availability are stabilized. Gone are the economic guesswork and disappointments in delivery. Here to stay is a distribution network that practically puts synthetic glycerine in customers' back yards.

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MARKETS



New Tangent in Glycerine?

Two unrelated glycerine developments—the Office of Defense Mobilization's closing of the government's glycerine expansion goal and the recent $2\phi/lb$. slash in synthetic glycerine prices (CW Market Newsletter, Sept. 1)—have this week pushed the old-line polyhydric to the forefront as a hot topic of conversation among chemical marketers.

The first move assures synthetic's eventual production dominance over natural; the second underlines some competition from foreign influx of crude glycerine.

Equally interesting, though less openly discussed, are some behind-the-scenes ramifications that may cause an increase in epichlorohydrin production and boost total epoxy resins output in the U.S. within the next few years.

Current — and potential — epoxy producers are already maneuvering for advantageous posts in the race for

markets. For example, although it hasn't been officially spelled out, one of the reported applicants for a glycerine certificate of necessity, Carbide and Carbon Chemicals, will probably not carry operations through to glycerine if it's granted a fast tax write-off, instead will stop at the epichlorohydrin stage of production. Epi, one of the prime ingredients for epoxies, would then, logically, be supplied to the firm's sister division, Bakelite.

The latter, of course, has been a good customer for epichlorohydrin (chiefly from Shell Chemical's synthetic glycerine installation), but the move toward integration could make for a more profitable venture. Bakelite has been producing epoxies at a better-than-2-million-lbs./ year rate for some time (CW, Sept. 19, '53, p. 81), now definitely plans expansion. The company holds an ODM-granted certificate for a \$360,000 epoxy resins

plant that will add to existing facilities, enable it to produce as much as 6 million lbs./year by mid-'58; largerscale plans, perhaps for a sizable new plant, are being considered for beyond that date.

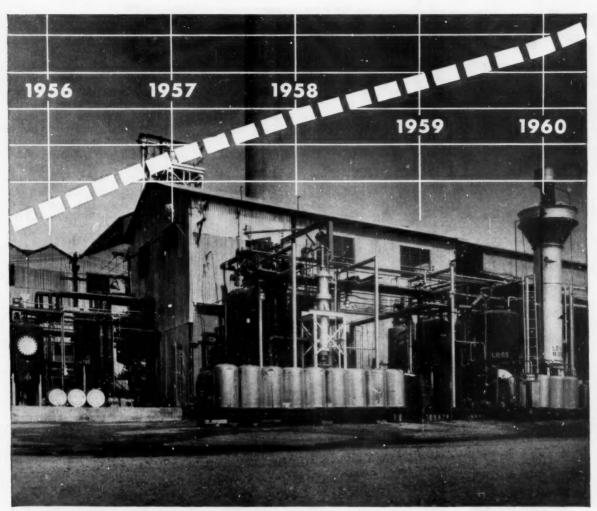
Typical of the reluctance of most glycerine-involved marketers to discuss their activities ("it would disclose our competitive position") is Dow's hesitation in answering some direct queries concerning (1) size of the planned synthetic glycerine capacity expansion, it announced early this year; (2) if and when the company plans to enter the epoxy resins manufacturing field.

That Dow will become an epoxies producer has been pretty well conceded in the trade since '53. In that year. the company decided to build a synthetic glycerine plant at Freeport, Tex., using a similar-to-Shell process that could yield epichlorohydrin; Dow received a \$950,000 bisphenol certificate of necessity, providing the other necessary epoxy component. In the fall of '54 came a further indication that Dow was on the way to becoming an epoxy maker-it signed a licensing agreement with Devoe & Raynolds. (Shell and Bakelite are operating under similar arrangements.)

It won't be officially known until later this month whether Dow will be one of the receivers of a fast tax write-off for glycerine—paperwork is still in process in Washington—but chances are the company will go ahead, in any event, with its proposed glycerine expansion; it is spending at least \$75 million on a current expansion program.

How will this affect total U.S. capacity for glycerine? Dow, of course, hasn't even hinted at a quantity figure, but trade speculation is that the Michigan firm may actually double its present 36-million-lbs./ year potential. This, plus Shell's reported capability to produce as much as 20 million lbs. over its rated 80-million-lbs. capacity, plus the capacity of two likely new producers (Carbide and Olin Mathieson), could push total U.S. synthetic production capacity well beyond the ODM goal—if all were, in fact, used to turn out glycerine.

But how much glycerine capacity is really needed? Some trade analysts believe that 325 million lbs./year of glycerine, which now seem assured



LOOKING AHEAD—This pilot plant is typical of Hercules facilities devoted to the development of new products for the rubber industry. Chart of future rubber consumption is projected on the basis of government statistics.

Hercules Facilities Keep Pace with Rubber Industry's Growth

This new pilot plant at Hattiesburg, Mississippi helps pave the way for new and improved rubber chemicals for tomorrow.

Hercules has pioneered in the development of Dresinate® rosin soap emulsifiers, and other products such as hydroperoxide catalysts and brick defoamers. New materials, the result of continuing research by Hercules, are now being readied for commercial production.

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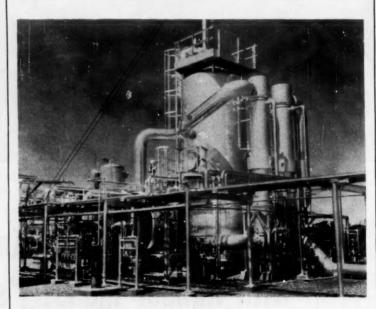
In Cleveland: F. W. Kamin Co.

MARKETS

by the closing of the government goal, will not be needed for perhaps three or four years. (The goal is based on the assumption that 140 million lbs. can come from existing non synthetic sources (see chart) and about 185 million lbs./year from tax-aided synthetic construction.) They base their reasoning on the current and projected growth of civilian glycerine use-now running at about 240 million lbs./year and likely to hit a maximum of some 260 million by the end of the decade. There's one qualification for that maximum, however: that no "big time" civilian outlet develop before then-none is foreseen.

The scratching of glycerine from the expansion goal list (it was the last of more than 60 such mobilization targets) came when the Business & Defense Services Administration decided that production capacity planned and existing will be sufficient for mobilization needs. If the policy BDSA followed for other projects holds true in this case, the government's glycerine goal was arrived at by adding projected military requirements to "normal" peacetime consumption rates. It's in the latter area that some market researchers disagree with Washington's conclusions.

Should Olin Mathieson receive a tax write-off and decide to build quickly, the move could have a sharp impact on the glycerine market. OM is a heavy user, and such construction would be primarily for captive purposes. Thus the switch from buyer to self-supplier could well add to the problems of synthetic glycerine-epichlorohydrin sellers, even if Olin's installation does round out the defense

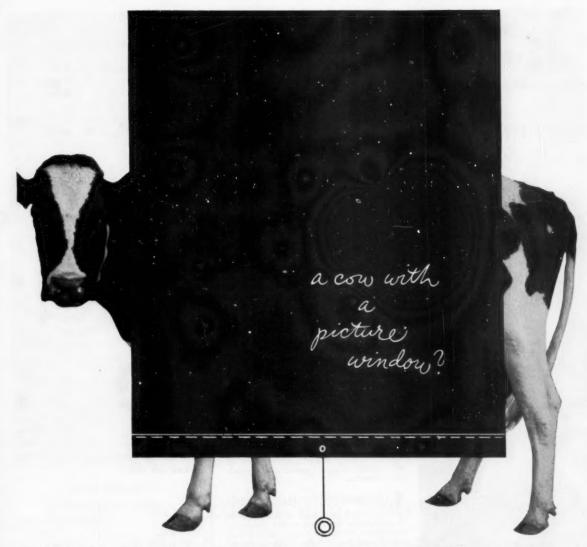


Waste Gas Brimstone

SULFUR RECOVERY from waste petroleum refinery gases is under way at a 40-tons/day unit recently completed by Montana Sulphur and Chemical (Billings, Mont.). Raw material will be hydrogen sulfide gases—obtained from Carter Oil and Continental Oil—that formerly were flared or used as fuel.

Major users of the recovered sulfur are West Coast pulp and paper producers.

The new unit, which cost nearly \$500,000, was built by Badger Mfg. (Cambridge, Mass.); it followed construction of a hydrogen sulfide recovery plant for Montana Sulphur by Proctor Engineering (Tulsa).



The scientific teams at the Agricultural Research Center of Chas. Pfizer & Co., Inc., will go to practically any length in their search for new "miracle" products to make animals grow faster and stay healthy. They actually installed a "window" in a cow's stomach to study nutritional processes in their search for more effective growth stimulating feed supplements. This is just one example of the never-ending research that has made Pfizer a leading manufacturer of antibiotics.

Maintaining the purity of their products is so vitally important that Pfizer takes the scientific approach in selecting their packaging, too. In searching for a container to ship antibiotic intermediates from their huge Vigo, Indiana, plant to their eastern factories, Pfizer considered and tested many types of containers. Inland lined steel containers were finally selected on the basis of (1) their ability to protect costly intermediates perfectly under all shipping conditions, (2) their economy, (3) their rugged strength. "We've depended on Inland drums for several years," says C. W. Smith, Vigo plant superintendent. "And they've never let us down."

NOW . . . ABOUT YOU. Maybe your product doesn't demand the extreme care that must be used in packaging

NOW . . . ABOUT YOU. Maybe your product doesn't demand the extreme care that must be used in packaging wonder drugs. But whatever you make, and no matter how carefully you make it, the follow-through of skillful packaging is too important to be overlooked. For complete information on new developments in steel packaging that may solve your problems, write Bob Boecher, Dept. 313A today.



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Haveg materials developed from special synthetic resins reinforced with selected chemically inert agents provide rugged strength and durabilityplus exceptional resistance to corrosive chemicals and atmosphere-for a vast variety of industrial equipment.



PROCESS AND STORAGE TANKS

New lightweight polyester glass tanks now augment the complete Haveg line of reinforced plastic tanks for every service. Manufactured and installed at costs considerably below those for lead or rubber-lined, stainless, and in some cases even mild steel constructions, the new polyester tanks offer additional saving in minimum steel requirements for support, ease of installation and maintenance-free service.



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A complete Haveg fume removal system consisting of corrosion resistant duct, hoods, stacks and fittings offers the most efficient and economical installation for handling corrosive fumes and gases at atmospheres up to 350°F. Units are readily fabricated to accommodate the most intricate system layout and are available individually to replace deteriorated apparatus in existing systems.



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NOW-TEFLON*

with all its superlative qualities has been added to the growing list of ma-terials used by Haveg to manufacture corrosion resistant equipment.

It is now carried in stock as tubing. pipe and rod. Production now starting on "Teflon" lined steel pipe, fittings, and vessels.

"TEFLON"—du Pont trade name for Tetrafluoro ethylene resin.

Whatever your corrosion problem, Haveg research has developed the plastic to solve it at low cost. Haveg engineers are prepared to assist you in selecting the Haveg equipment to meet your requirements or to custom design and engineer your process installations to assure you full advantage of Haveg's low cost production methods. Discuss your operations with a qualified Haveg representative . . . or write for Haveg Bulletin C-14 at no obligation.

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MARKETS

planners' peace-plus-war expansion requirements.

Export Bumping: When Shell cut its synthetic glycerine schedules by 2¢/lb. to establish a 28¢ tank-car tag, it also led the way for a like reduction in refined natural prices. (Since then, crude glycerine prices have again tumbled-80% soap lye grade is down to 15¢/lb.: 88% saponification, to a nominal 161/2 c.) The skidding in domestic prices has been attributed to a weakening in foreign crude prices -which have reportedly reached a low of 15¢/lb., c.i f. N.Y.—within recent weeks.

But perhaps more significant as a synthetic and refined glycerine price depressant is the current status of inventory stocks. They're higher now than they've been in quite a while. Stocks at midyear, for example, topped 65 million lbs., almost 23 million lbs. more than the '55 year-end level of 42.4 million. Crude domestic production was cut back during the summer, but not enough to whittle inventories appreciably. In past years, 60-millionlbs. inventory (equal to about three months' production) was considered normal, but not once during '55 did stocks (all grades) reach the 50million mark. Since January, however, the rise has been dramatic. Note this six-month climb:

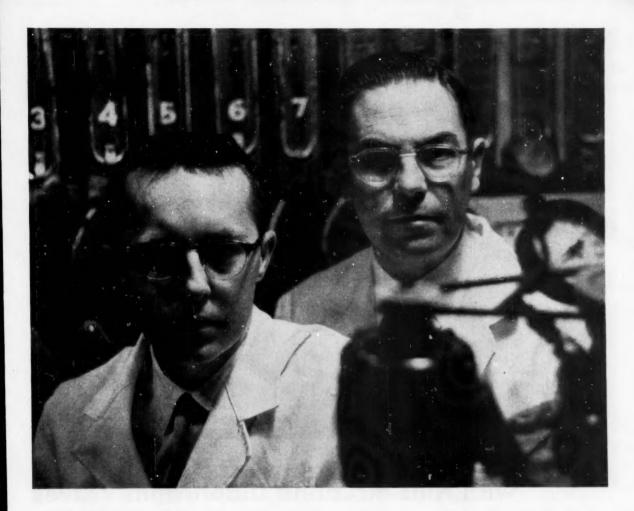
Glycerine Stocks

(beginning of month)

	(million pounds)	
Jan.	52.0	
Feb.	55.3	
March	58.9	
April	65.6	
May	64.6	
June	65.0	

What's worrying sellers now is that demand, though not slumping, may not move along soon enough and at a fast enough clip to keep stocks down to reasonable levels. The price markdowns may help.

Glycerine outlook for the longrange future, however, poses no problem. Consumption is expected to rise steadily if not spectacularly, and with much of the probable upcoming expansion in capacity likely to be diverted to epichlorohydrin manufacture for use in the fast-stepping epoxy resins, the excess potential that's in sight will not weigh heavily on the market.



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For general information about methyl chloride and its bulk application, write to Bob Zellner. Questions or just conversation relating to methylation should be addressed to Morrie Neuville. The Ansul Chemical Company, Dept. C-12, Marinette, Wisconsin.



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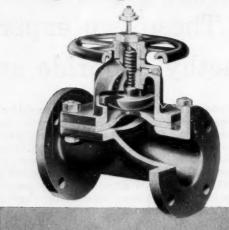
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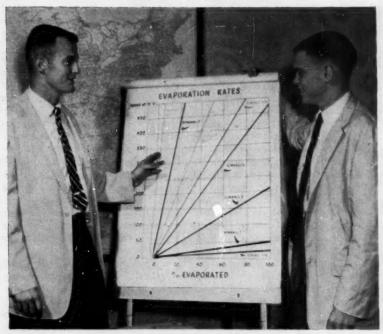
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SALES AND DISTRIBUTION



COLLEGE STUDENTS: Vacation jobs in sales department help Dow to . . .

Plant a Staff in Summer

As students leave summer jobs in the chemical industry this week and head back to the campus, sales managers in several chemical companies are hopeful that they've found a way to ease the severe shortage of chemical salesmen. At least four firms—Dow, Monsanto, Wyandotte and Union Carbide—have had college students hard at work at marketing projects over the summer months, expect that some will eventually become permanent employees.

Although well established as a recruiting device for technical personnel, summer hiring of college students is a new approach to sales staff procurement. Monsanto, with seven students in sales and one in traffic, and Wyandotte, with one such part-time employee, tried the method for the first time this summer. Dow launched a limited program in '54, has since scaled it up. This year, of 140 participating in the Midland division's over-all student employment program, 11 worked at sales tasks, 5 in technical service.

Chief purpose in hiring students for temporary jobs, of course, is to line up potential full-time permanent employees. The student favorably impressed with a company will likely consider it a good place to work after graduation. Moreover, he's likely to make favorable comments to his classmates, spur their interest in the firm too. Other important aims: provide employer with a chance to observe the

student's abilities and potential; free full-timers from work less experienced men can handle.

Operation: Activities of students in part-time marketing jobs are generally handled as part of the over-all student summer employment program. At Dow and Monsanto, for example, departments submit lists of projects suitable for student assignments early in the year. The personnel department then recruits the needed manpower during their regular campus visits. Salaries vary, but in some firms approach the rate (\$350-\$400/mo.) offered new graduates. Interestingly, although summer placement is considered a recruiting tool, the work performed often largely justifies the salary. Any costs not matched by the student's service at Monsanto, for instance, are regarded as a recruiting

Generally, preference is given to students between the junior and senior year and to graduate students. But others also are employed. The companies match the student to the job as much as possible, actively seek student opinion about their work and the company. At Dow, the same questionnaire is filled out at the beginning and the end of employment. Periodic ratings by supervisors help measure the merit of a student as a full-timer. Of 89 students in Dow's 1955 Midland program, there were "only two we wouldn't want back."

Projects: At Dow and Monsanto, a specific work assignment is the heart of the program. Significantly, students



JOB CLINIC: Collegians probe Monsanto careers with Sales Director Hobson.



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West Virginia Pulp and Paper Company CHARLESTON A, SOUTH CAROUNA are not assigned to actual selling. The projects usually let the student participate in work related to sales, offer a vantage point for observing the sales function.

In Monsanto's Plastics Division, two students processed orders, one worked at technical service and a fourth surveyed (by field trip and literature search) the major appliance field to determine the quantity and types of plastics in use. This "market researcher," a chemical engineer, will begin graduate work this autumn.

Many sales assignments that Dow's Midland division has found suitable for students contain a strong market research element. One student developed, organized and correlated data for merchandising of coating materials. Half his time was spent in the field. Another, in technical service, handled routine inquiries, helped write a report on a product survey, developed literature for a new product. He also scanned sales figures to calculate the market for a specific item, and worked at routine sales development problems.

In contrast, Wyandotte programed its single sales department summer student for a two-week stint in sales administration and a 12-week study of manufacturing, research, packaging and shipping. And Union Carbide's Bakelite division assigned a "potential salesman" to its quality control department.

Tying the Knot: Presentation of a factual view of company operation and job responsibilities by actua' working experience is the key factor in demonstrating to students the merits of the company. Glamorization is avoided. Students in sales take the same orientation program as all other students. At Dow, this is a series of weekly luncheons at which officials explain activities of the various departments, and company philosophy. Monsanto's orientation includes plant and office tours, safety and departmental indoctrination, "get acquainted" help from counselors assigned to each man and a "job-opportunity" clinic. The clinic, part of a one-day orientation program, follows lectures on sales, research, engineering, and production.

Social activities make the student's visit still more rewarding. In some cases, living quarters are suggested to the student, and one-way transportation to the company is paid.

Not Unanimous: Many companies

queried by CW report they are not employing students in sales, although they often hire temporary technical people. Some simply "never considered it;" others have, but rejected the notion. Typical reasoning:

• Technical knowledge needed by sales department members precludes the placement of a student without first giving extensive background on the firm's technology.

• Few students consider selling as a career while at college. The number interested would not justify establishing summer marketing jobs.

Customer contact work is a sensitive position. A student's mistake could be difficult to overcome.

• Sales manpower requirements are not large enough to justify using such a device. (This reply generally came from smaller companies.)

 Students may unwittingly "leak" confidential information when they return to school, or go to work for a competitor after graduation.

 Students reacting unfavorably to a company can discourage others from joining the firm.

Programs of companies using sales students are generally designed to overcome these objections, although Dow and Monsanto "are willing to take the risk" in assigning students to confidential tasks. Bakelite's use of a sales student in quality control is one such attempt. The position familiarizes the student with company products, and, to some extent, their manufacture, and with handling of customer complaints.

Does It Pay? Just how well summer sales employment for students will work as a recruiting device won't be known for several years. The programs are new and many students have yet to complete their education, accept permanent positions. Wyandotte, Monsanto and Dow have high expectations, are eyeing future expansion. Dow is even examining the feasibility of hiring marketing and business administration professors over the summer months. Often an influence on a student's choice of a career and company, the educators apply their know-how to company problems, get a chance to appraise the firm.

If the current programs prove out, more companies (several report they are "very interested") and more salesmen may soon start out on similar summer programs.



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SALES



'STUDENTS' learn, from Mutrie's John Roberts (right), what tank truckers need from chemical shippers, but get an earful of chemical industry gripes, too.



Truckers get 'Educated'

More than 140 members of the National Tank Truck Carriers Assn. late last month assembled at Michigan State University's Kellogg Center to get pointers on how to handle chemicals in their tank trucks. The program rolled along smoothly for the first three days, but then an unexpected feature was introduced: the "students"—all management-level executives—were dressed down for the poor service some of them are rendering to the chemical industry, then later heard their past performances stoutly championed.

Pointedly, Walter Saaby, traffic manager of Victor Chemical, warned the truckers: "If we [the chemical companies] cannot get service—the best kind of service—for our customers, we may be driven into the trucking business ourselves."

Saaby dropped the gauntlet before his audience on the last day of the four-day second annual session. Prior to that, the tank-truck men had been treated to a series of lectures that covered almost every phase of chemical transportation by tank truck.

Demands Personal Service: Speaking for the chemical manufacturers, Saaby said: "We cannot be treated as step-children. We deserve first-grade equipment, not second-grade. We deserve personal service. After all, we give personalized service to our customers; why shouldn't we get it from our carriers?

"The growth of highway transportation of both liquid and, in the near future, enormous quantities of dry chemicals, is only beginning. A tremendous future is in the offing for both of us, so why shouldn't we be

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Maintenance of equipment and the right kinds of proper equipment in sufficient quantity to service the chemical customer are "musts," Saaby emphasized. "Dispatchers should know something about us and our customers. We're happy to tell them if they will listen. Service must be excellent."

Education for drivers also came under Saaby's scrutiny. Suggestions here were that a driver should know what he is delivering; a dispatcher should know what the driver is delivering—and both driver and dispatcher should have some idea of what the customer is going to do with the delivered product. "If a driver doesn't know what's in that big tank he's hauling," said Saaby, "then educate him to say nothing at all."

Concluding his talk, Saaby warned the truckers: "There is a trend that is very disturbing to me. It is the trend by some of our competitors toward buying their own tank trucks and giving their customers the sort of personal service they think the customer is entitled to get. We do not think this is economical. We don't want to do it. But if our competitors do it, and by so doing give customers the type of service that I cannot give through my tank carrier—just what is the answer going to be?"

Carriers Defended: The other side found a champion in J. A. Roberts, vice-president of P. B. Mutrie Motor Transportation. He called for a sympathetic and helpful approach from the shipper with respect to the truckers' traffic problems, urged that shippers' traffic departments supply more precise information to the carriers about the commodity being hauled. "In many cases," he argued, "the precise information is lacking because the [shipper's traffic man], though he is responsible for contacting the carrier in the assignment of movements, is not conversant with the specific nature of the commodity nor how it should be handled." Some of the precise information Roberts suggested that shippers supply to carriers: nature of the products, hazards, type of lining required, viscosity limits, loading temperature, insulation required, recommended cleaning procedure, weighing requirements, condition the tank interior must be in to receive a given product. He also urged shippers to tell carriers what facilities the consignee

has; if loading is from rail tank car, what is needed for loading, and what the unloading hours are.

On the last point—unloading hours—Roberts called for assistance from both shipper and consignee to set reasonable loading and unloading hours and to avoid early afternoon shutouts.

On the subject of special equipment. Roberts claimed that generally the trucker has fully cooperated with the shippers. But many times, he said, instead of changing their loading or unloading facilities at a minimum of expense, shippers request the carriers to handle unreasonable lengths of hose for which no provisions are made on the trailer unit. In many cases, 50 ft. of standard pipe permanently installed at the loading or unloading points would eliminate a problem of this kind. Another complaint: often the carrier is required to supply stainless steel items, such as pumps, end hose, barrel fillers, only to find that the product being shipped is to be stored in carbon steel drums or storage tanks.

Also coming in for comment by Roberts: careless loading practices that damage carrier equipment, cause high maintenance costs that lead to higher rates. He also asked that the growing practice of delivering corrosive and flammable liquid chemicals in such containers as drums and carboys be discouraged, to protect workers and property from injury.

Summing up, Roberts defended the carriers' past performance, urged further cooperation: "We think that the carrier needs from the shipper a fair understanding of what he, the carrier, has done and is doing for his customers. The shipper should understand that the healthy, solvent, safe, reputable, properly equipped carrier is an extremely important player on the shipper's own team. To foster unworthy competition, to make unreasonable requests, and to promote unprofitable operations is taking a short-sighted view, and can serve to undermine and demoralize the carrier industry whose continued healthy existence is vital to the shipper's own progress and prosperity."

Next Year, Petrochemicals: Despite the hassle over the truckers' past performances, reaction to this year's meeting was enthusiastic and plans are already under way for another next

turns the wheels...

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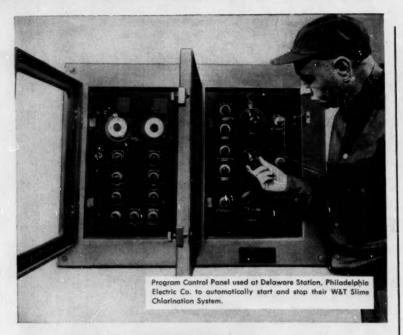
The first product—a general purpose, easy processing Polyvinyl Chloride Resin—will be in production soon for use in the calendering, extrusion and molding industries. Following this, Escambia Bay will produce a molecular weight range of straight PVC Resins including types for electrical and rigid applications.



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SALES

year. Subject then will probably be petrochemicals and petroleum, and special techniques for handling and transporting them.

With Saaby's warning about chemical companies turning tank-truck operators unless they get service, truckers went home with plenty to think about. And with Roberts' clearly defined statement of what the carrier's needs are, chemical companies should be able to anticipate many of their traffic problems.

DATA DIGEST

- Packaging: 24-p. booklet tells how to select and specify corrugated boxes, gives hints on shipping, packaging, handling, shipping rules and regulations. Hinde & Dauch (Sandusky, O.).
- Polyethylene: 4-p. brochure presents information on uses, physical, electrical, fabrication, injection-mold-



Chemicals Head

SHIPPING BARGES will be more in evidence as chemical companies try to sidestep rising rail and truck freight rates. Olin Mathieson this month is putting into service six 195-ft. all-welded-steel barges (see above) at Catlettsburg, Ky., to carry soda ash, fertilizers, other bulk commodities on

ing properties of the company's new polyethylene product. Bakelite Co. (New York).

- Plasticizer: Bulletin describes company's liquid chlorinated paraffin, gives four typical vinyl resin formulations using material as secondary plasticizer. Diamond Alkali Co. (Cleveland).
- Fatty acids, oils: 4-p. technical bulletin gives specifications and typical uses of fatty acids, alcohols, glycerides, sperm oils; features chart on company's new saturated and unsaturated higher fatty alcohols. Archer-Daniels-Midland Co. (Cleveland).
- Nitrogen solutions: 48-p. book furnishes information on nitrogen solutions for fertilizer manufacture; gives typical formulas, formulating hints, safe handling practices. Nitrogen Division, Allied Chemical & Dye Corp. (New York).
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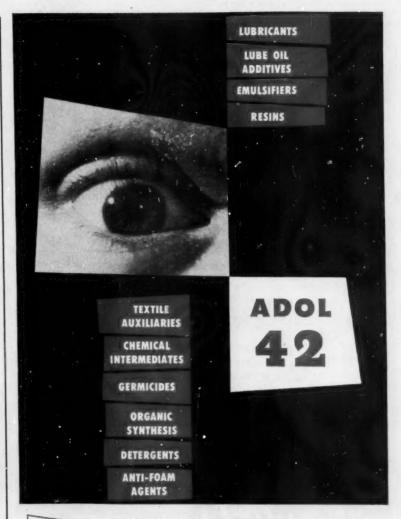
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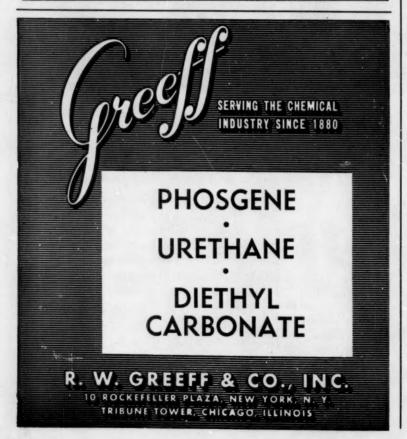
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In the workaday job of producing chemicals, our sights are never limited by routine. No matter how well our products meet customers' requirements today, we are aware that needs are likely to change with the times. So it is that we constantly search for ideas that will anticipate change and meet future conditions with the fullest satisfaction for our customers.

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SALES

cusses metal-cleaning and laundry applications of company's product; lists physical and chemical properties, packaging and safety precautions. Dow Chemical Co. (Midland, Mich.).

- Synthetic rubber: Two booklets give applications and properties of company's new synthetic rubber and latex products; describes stability, film color, emulsifier type. Firestone Synthetic Rubber and Latex Division (Akron).
- Exhibits: Three books contain complete annual schedule of shows and exhibits, arranged according to: industrial, chronological and geographical classification. Includes name, date, location of exhibit, attendance figures, name and address of permanent secretary or show manager. Listed are industrial, trade, professional exhibits, some up to 1965. Exhibitors Advisory Council, Inc. (New York).

Available from U.S. Dept. of Commerce, Washington:

- Pesticides: 213-p. book, World Survey of Pest Control Products, covers pesticide industry in U.S., 65 foreign countries; gives data on production, consumption, foreign trade, marketing raethods, distribution patterns, advertising media, government regulations relating to pesticides. Price: 60¢.
- Plastics: Trade list of foreign business firms gives plastic materials manufacturers and molders in Austria.
 Price: \$2.

COMPETITION

- Arner Co. (Buffalo) has adopted a new trademark featuring the company's name in white on a dark gray background.
- Du Pont's Fabrics and Finishes Division will build a 40,000-sq.-ft. regional sales office and warehouse in Kansas City.
- Tennessee Valley Authority will soon open fertilizer storage facilities capable of holding 16,000 tons.
- Cosden Petroleum Corp. is setting up marketing and distribution facilities for its multiviscosity polybutene.
- California Spray-Chemical Corp. has started using the chevron hallmark of its parent firm, Standard Oil Co. of California.
- National Laboratories, Inc. (Toledo), has expanded its sales force and production to add the West Coast to its sales area.

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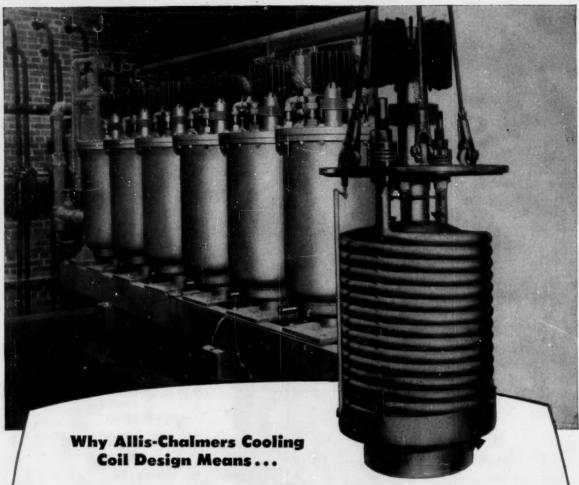
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Market

Newsletter

CHEMICAL WEEK
September 15, 1956

The rush is on by chemical marketers to post new fourth-quarter schedules—and most of the changes are on the up side.

Take chlor-alkalis, for example. Last week's tip (CW Market Newsletter, Sept. 8) that both caustic soda and soda ash would emulate the earlier \$2/ton chlorine hike is now being confirmed. Sellers are notifying customers that the increases go into effect Oct. 1.

The soda ash advance, initiated by Allied's Solvay Process Division, represents a 10e/cwt. increase on light, intermediate and dense material—Snowflake Crystals (sesquicarbonate of soda), Laundry Soda and Cleansing Soda (powdered modified sodas). Prices are f.o.b. maker's works. Typical: 58% light soda, c.l. \$1.55/cwt. in bulk; \$1.85 in bags.

And likely to become industry standard are the upcoming caustic prices already posted by one major producer. Liquid material (50% and 73%) will be marked up $10\phi/\text{cwt.}$, while flake caustic, in 400-lb. drums c.l. and t.l., will be raised $20\phi/\text{cwt.}$ A larger hike, $45\phi/\text{cwt.}$, will apply to the flake in 100-lb. drums (c.l., t.l.).

Wage increases and more-expensive raw materials—the reasons heard often these days—are behind U.S. Rubber's 2½-5¼% jump in prices of molded and extruded rubber products. The increases, which will affect "several thousand products" ranging from small bottle stoppers to large protective sleeves for oil well drilling pipe, follows a recent similar hike in the company's belting, hose and packing.

U.S. Rubber, though, isn't waiting for the last quarter, is making the new prices effective immediately.

Acrylonitrile, too, is reversing last summer's downward trek (CW, Market Newsletter, Aug. 13, '55), will be increased 1 e/lb. the first of next month. American Cyanamid was first to make the move, was followed a few days later by Monsanto. Reason for the upturn? The familiar plaint—higher manufacturing costs.

The advances nudge the synthetic rubber and acrylic fiber intermediate to a 28¢/lb. tank-car tag; c.l. quantities to 31¢; and l.c.l. in drums, to 32¢/lb.

Even supply/demand factors are taking a back seat to "mounting costs" as a reason for today's price-raising. For instance, though phthalic anhydride calls have slowed in the past few months, producers are upping prices immediately to spot customers, and on Oct. 1 to contract buyers, because of increased manufacturing expenses.

The increase, in the face of more than ample phthalic supply, is 1 e/1b. There's no indication as yet what effect this hike will have on phthalate tags now being clobbered to below-list prices because of rough competitive pressures (CW Market Newsletter, Sept. 1).

Market Newsletter

(Continued)

Earlier last week, isopropyl alcohol users got the word that all grades of the solvent would be raised 3e/gal. at the beginning of the new quarter. The amount is a repeat of the advance in April that applied to drum quantities, left tank-car orders unaffected. Under the upcoming schedules, tank quantities (95% material) will sell for 42e/gal.; c.l. and l.c.l. will go to 58e/gal., respectively.

The methanol market has been pretty much in balance, but again increased costs (container prices and freight rates) are the influences behind Du Pont's posting of higher delivered-drum prices. Spot orders in c.l. lots are up 1¢/gal. (to 46¢/gal.); 2¢/gal. on lesser quantities for Zone 1 delivery. Zone 2 (Western) shipments are increased like amounts. Oct. 1 is the date for contract buyers.

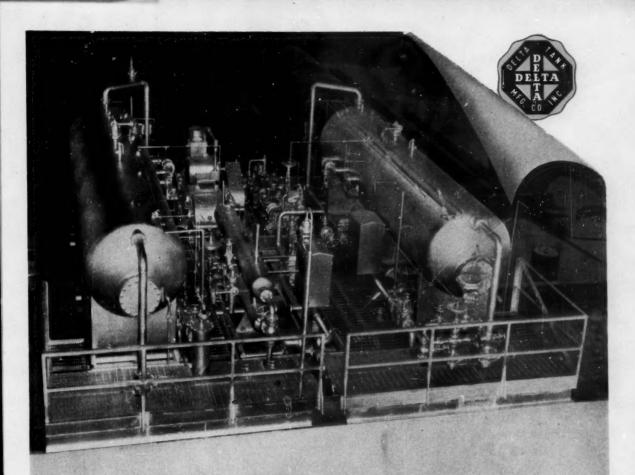
In another area, polystyrene—and literally bucking the general trend toward higher prices—Monsanto, in midweek, quietly informed its customers that a sharp cut (as much as 3e/lb. on some resins) would go into effect immediately. But though the company didn't make a public announcement, the competition (including Dow and Koppers) wasn't too far behind with similar reductions. At week's end, Bakelite hadn't yet figured new schedules, but told CW its "prices would be competitive."

Polystyrene crystal resin (water clear) now costs $27\frac{1}{2} \frac{e}{l}$ lb. (just a half-cent above standard vinyl resin), while general-purpose crystal molding resin dropped the full $3\frac{e}{l}$ lb. General-purpose standard colors, high-heat standard colors, and special colors in both general and high-heat resins are off $2\frac{e}{l}$ lb.; medium-impact materials, down $1\frac{1}{2}\frac{e}{l}$ lb.

All the news, however, isn't price-tied. Nitrogen sellers, long eyeing the nation's forests as potential "big time" fertilizer outlets, will watch with keen interest Allied's (Nitrogen Division) kickoff this week of its officially unannounced, high-powered publicity campaign extolling the benefits possible with woodland fertilization. First phase: fertilizing, from the air, an 11-acre experimental forest stand at Rutgers University—and before cameras.

SELECTED CHEMICAL MARKET PRICE CHANGES-Week Ending Sept. 10, 1956

UP	Change	New Price
Methanol, drms., c.l., dlvd. Zone 1 (spot), gal	\$0.01	\$0.46
Methanol, drms., c.l., Zone 2 (spot), gal.	0.01	4.49
Potassium stannate, drms., frt. alld., E., lb	0.004	-0.709
Casein, Argentine, acid precip., grd., bgs., c.l., duty pd., lb.	0.005	0.22



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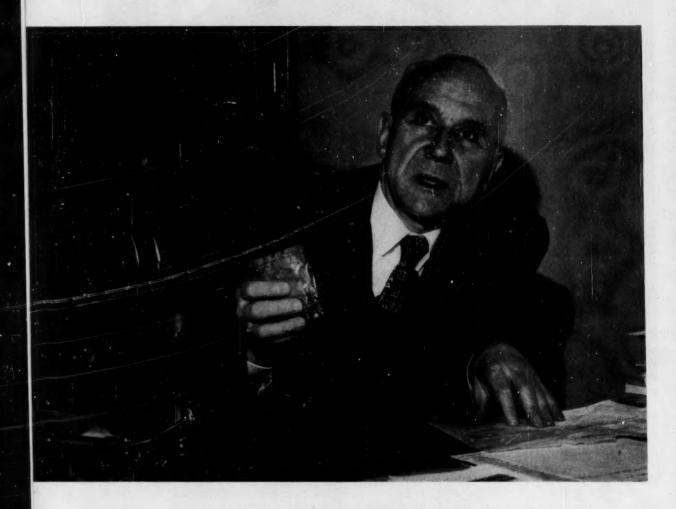
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RESEARCH



More Waste than Haste in Titanium?

"Wasteful competition, redundant research programs and government secrecy . . . have been holding up large-scale development in various rare metals, especially titanium." That's the opinion of vociferous, 67-year-old William J. Kroll, whose world-famous reduction process led to commercialization of titanium and zirconium. Here, in an exclusive interview, are his frank comments on U.S. metals research.

From his well-kept bachelor's house in the campus-town of Corvallis, Ore. (Oregon State College), pioneer* metallurgist William J. Kroll had some harsh things to say this week about U.S. research in titanium, zirconium and the other "wonder" metals.

"Unnecessary secrecy . . . misguided competition have forced industry and government to duplicate vast areas of applied research and process development, while at the same time the most important fields of basic research that really need attention are overlooked," he forcefully states. Kroll explains that there might be a good future for fusion electrolysis of titanium. "But for successful operation," he points

out, "the electrolyte must be of specific composition with regard to valency [of the metal], electrochemical behavior and fusibility.

"These essential data," he says, "remain in the dark, while government supports and engages in commercial development work better left to the care of private industry."

Among other research projects Kroll feels have been sadly neglected is a

^{*}Despite a welter of development work by industry and government in the past decade, most of the country's titanium and zirconium production is still based on the Kroll process (which involves magnesium reduction of the tetrachloride under an inert atmosphere).

thorough study of the fusibilities ir carrier salts of titanium and zirconium halides of different metal valencies. "Now," he says, "we don't even know to what extent titanium tetrachloride is soluble in fused sodium or magnesium chloride. We sadly need the knowledge required for production of titanium dichloride and trichloride in pound lots, for evaluation work."

Another overlooked study, Kroll feels, covers the temperatures at which various sodium chloride-titanium trichloride mixtures melt. Also neglected, he believes: the thermal stability of titanium and zirconium nitrides; and hydrogen equilibrium pressures at the melting point of the metals.

Kroll is disturbed that these fundamental studies are not getting sufficient attention by university researchers a fact that, he believes, could cause the country to lose its lead in the race for more and better metals.

Kroll feels so strongly about this subject that he has established four fellowships at universities here and abroad. At Oregon State College, he is sponsoring a fellowship on end-uses of titanium; at two German universities, on titanium suboxides and anode effects in fusion electrolysis; at a Japanese university, on equilibrium diagrams.

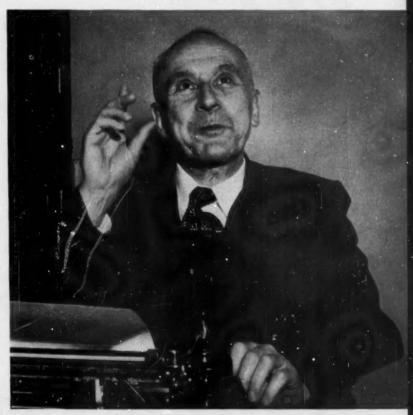
In so doing, Kroll is, in effect, plowing back some of the royalties he is receiving for his U S. titanium patent right. This patent was seized by the Alien Property Custodian early in World War II. Only recently, after years of litigation, was part of the right returned to Kroll, who is now counting the money left after paying attorneys and taxes. And his right expires in 1957.

Though in semiretirement, Kroll is keeping close tabs on titanium, zirconium, boron and other current metallurgical developments. He serves as a consultant (for Pacific Coast Borax, among others), reads and writes a good many hours every day and travels widely to scientific conclaves.

Where titanium making is concerned, he is convinced that vacuum distillation is a better method than leaching to separate titanium sponge from MgCl₂ and excess magnesium. "For one thing," he says, "(distillation) leads to lower oxide and hydrogen content; we probably never will make



'Unnecessary secrecy and misguided competition have forced duplication of applied research and process development.'



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'We are copying the collectivist methods of Russia.'

a titanium lower than 130 Brinnell with acid leaching.** Also," he believes, "recoveries are higher, so that while vacuum distillation is basically more expensive than leaching, the extra cost will be only a few cents per pound."

On substituting sodium for magnesium in the reduction of titanium tetrachloride, Kroll sees three possibilities (excluding the gas-phase reduction, which up to now hasn't been successful): (1) simple substitution (which is difficult because of the accurate heatcontrol system required-sodium melts at 800 C, boils at 880 C); (2) one-step reduction below 600 C by the so-called high-surface sodium method (favored by Imperial Chemical Industries), whereby titanium tetrachloride is reduced on a sodium film deposited on a solid NaCl support; (3) two-step reduction.

Kroll sees most promise in a twostep reduction—first to titanium tetrachloride, dissolved in sodium chloride, below 700 C: then after-reduction of

**(Kroll would get an argument from Titanium Metals Corp. (New York), which uses the leaching process. According to Titanium Metals, it readily meets 125 Brinnell specifications, has made titanium with a Brinnell below 100.—Ed.].



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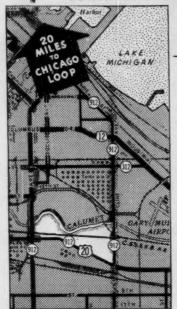


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the fusible mixed salt with more sodium, above 800 C. Reason: this semicontinuous process allows easy heat control, since the heat evolution can be spread over two steps. Also, "the pure titanium crystals obtained by after-reducing the salt of the lowervalence metal are easily removed and leach quite well."

But in zirconium production, Kroll sees no special or decisive advantage of sodium over magnesium in the reduction of zirconium tetrachloride.† What's more, he feels, sodium introduces the risk of explosions. He is sure that zirconium has a big future as a corrosion-resistant material of construction where tantalum can't be used (under alkaline conditions, zirconium is actually better than tantalum or nickel), or where tantalum is too costly. Zirconium resists hydrochloric acid and nitric acid at all concentrations and temperatures. Body fluids do not react with it, so it is recommended for skull plates, surgical wires and bone screws.

Case for Independence: Kroll expects major strides in metallurgical research—and research in general—wil! be made by individuals, rather than by teams. "Many, even in university circles," he avers, "believe that research by the individual is gone forever"—a situation that Kroll deplores. "We are going to cause ourselves a lot of harm," he warns, "by trying to think collectively and to do by mass movements what the individual accomplishes faster and cheaper, thanks to his imagination and devotion.

"Moissan and Ruff gave us the chemistry of fluorides, which made . . . the uranium isotope separation via UF6 possible. The enormous prosperity that cheap atom power will bring goes back to the work of the Curies, who for years struggled alone in poverty and under impossible sanitary conditions to isolate radium. It was Heroult and Hall who gave us aluminum; Mishima, the high performance magnet steels.

"Compare that with the performance of government and corporation research laboratories. By trying to discover and invent in captive laboratories, we are copying the collectivist methods of Communist Russia. Everywhere, new and often palatial research facilities are being erected, where a crowd wants to invent by push-button

tHere, too, there's room for disagreement. National Distillers uses sodium reduction in its zirconium process.

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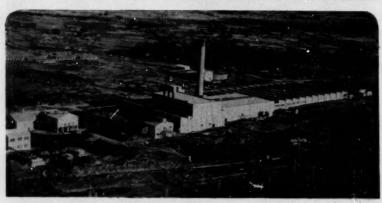
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methods and by operating research machinery."

Luxembourg-born, Kroll himself started working on titanium in 1930, "primarily because it was the last untapped metal available in large quantities." In 1938, he came to this country to sell his process, developed with his own means and with no outside help. Of the six top companies of this country engaged in metal extraction or processing, only one, Westinghouse, was inclined to buy some titanium-2 lbs./year for development work on photo-electric cells. "All six companies," Kroll relates, with obvious satisfaction, "are now busily producing or processing titanium."

Kroll returned to Europe, left to escape the German invasion. In 1945, he moved to the U.S. Bureau of Mines Station at Albamy, Ore., to develop a process, starting from Oregon beach sands, for ductile zirconium. He and fellow bureau staffers took just eight months to produce the first strip of ductile metal. A larger plant, with 150-lb. reactors, was built later, is still in operation. In 1950, he resigned from the bureau to devote all of his energies to his suit against the Alien Property Custodian.

Through it all, Kroll has had no direct hand in the industrial development of titanium. His involuntary retirement from the American research scene has led him to ruefully comment: "I hate the day I discovered my titanium process."

Room for Dissension: Not everyone will agree with either Kroll's somber appraisal of the state of titanium development or his individualistic approach to research. Advocates of team research believe from their personal experience that a group of specialists attacking a problem is more likely to produce significant results oftener than even a highly creative individual. They recognize the importance of having high-caliber men on the team, count on each member contributing as much as he can, advocate reconstituting such teams from time to time to guard against a stylized approach to different

But neither will they deny that Kroll's prestige and numerous research accomplishments (he has held around 40 patents at one time or another) have earned him a voice among government, industry and academic researchers.

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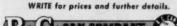


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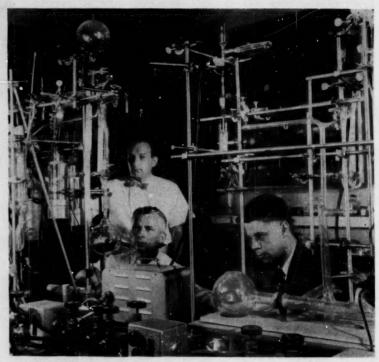
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New Clues to Conductivity

Two theories recently advanced by Bell Telephone Laboratories' (New York) chemical physicist Howard Reiss and chemical electronics researchers J. J. Lander and D. G. Thomas may explain why dissolved hydrogen does not affect the conductivity of some semiconductors while markedly increasing that of others.

Their work sheds new light on such widely differing phenomena as electronic conduction in organic crystals, catalysis of some chemical reactions, and the functioning of oxidecoated cathodes.

So far, the bulk of their research has centered on two semiconductor materials: zinc oxide and germanium. The former's conductivity is raised by dissolved hydrogen; germanium's is unaffected.

Thomas and Lander theorize that in zinc oxide dissolved hydrogen atoms combine with oxygen atoms to form hydroxyl groups. The hydroxyl groups then ionize, freeing electrons to participate in the conduction process.

*Left to right: Howard Reiss (standing), J. J. under and D. G. Thomas.

In confirmation of this mechanism. they report that conductivity of zinc oxide varies with the pressure of the hydrogen atmosphere in which tests are made.

Reiss suggests that hydrogen atoms cannot ionize in the germanium crystal, hence do not contribute electrons to the conduction process. That would explain why the conductivity of pure germanium is not increased by dissolved hydrogen.

The Bell team will study a broad range of semiconductor and chemical materials under varying hydrogen pressure.

EXPANSION

- · Pitman-Moore Co. has opened its new pathology research laboratories near Indianapolis. The new lab will assist research staffs at the firm's Indianapolis plant and Zionsville, Ind., biological labs. It will also conduct an independent pathology research program.
- Industrial Bio-Test Laboratories has completed a new \$150,000 In-



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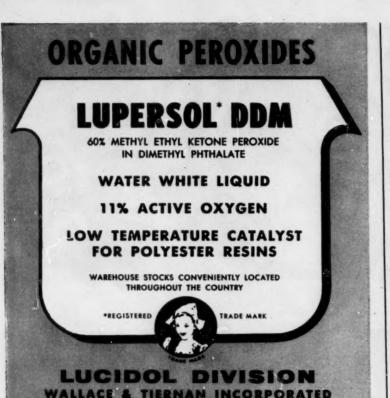
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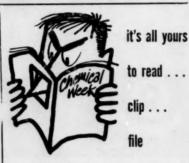
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dustrial Toxicology laboratory in Northbrook, Ill., a Chicago suburb. In addition to facilities for evaluating physiological and toxicological effects of chemicals on living organisms, the new quarters include laboratories for radioisotope and chemical research.

· Dunlop Rubber Co. has completed a new radiation laboratory at its Birmingham, Eng., research center. Reportedly the first radiation laboratory in the British rubber industry, the new unit contains a 100-curie source of cobalt-60; later, a 1,000-curie source will be installed.

· Hooker Electrochemical Co. will construct a new central research laboratory at Grand Island, N.Y., near Buffalo. It's expected to cost between \$1.5-2 million, employ about 200 researchers. Construction will reportedly get under way within a year, be completed within two years.

· Dow is expanding its basic studies in radiation chemistry. The firm has purchased two more 2-million-volt Van de Graaff particle accelerators (one is already in operation), will install one at its radiochemistry laboratory in Midland, Mich., use the other at its Western Division research lab in Pittsburg, Calif.

REPORTS

These new reports on government research are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

• PB 121024 summarizes five years of research on new methods of producing and maintaining extremely high temperatures in special furnaces. The report covers two phases-combustion of metals and combustion of gases. The metal studies deal with ignition temperatures and burning characteristics, thermodynamics of metal-oxygen systems. The gas-combustion section includes a detailed description of the combustion of zirconium powder and of a cyanogen and oxygen flame under pressure. Price: \$1.75.

• PB 121088, "Evaluation of Surface Treatments for Low-Alloy Steels, Part 2," describes surface coatings for low to medium-carbon steel, plain carbon steel, or low-alloy steels at temperatures up to 1200 F. Produced by chromizing and siliconizing, the coatings described are paint-type; they can be applied by brush, dip or spray. Price: 75é.



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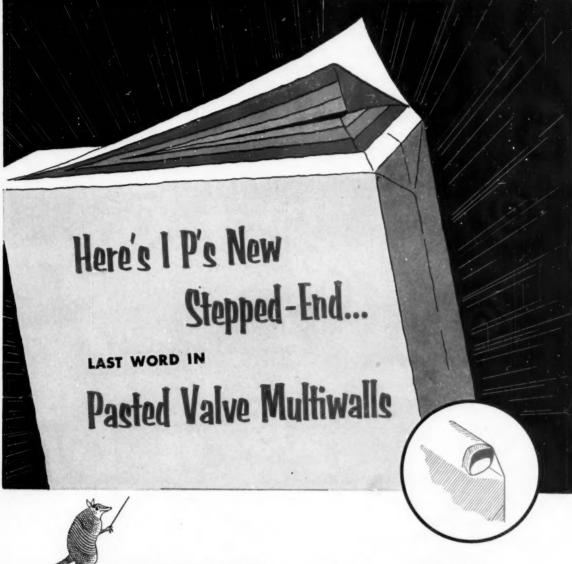
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